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THE STATUS OF AMERICAN RESEARCH WORK IN AGRICULTURAL LAND ECONOMICS[1]

L. C. GRAY

BUREAU OF AGRICULTURAL ECONOMICS

The survey of American research in agricultural land economics, summarized in the present paper, gives the net impression of a large and important field, having a most significant relation to the welfare of agricultural classes and of the nation, and yet but barely scratched by the plows of research workers.

The experiment stations particularly have made comparatively little progress in developing their research work in land economics. The current projects reported by state experiment stations may be classified as follows: five in land utilization, two in land settlement, six in which the study of land values and valuation is the paramount objective, and seven in land tenure.

Land Utilization Studies

As contrasted with farm management studies, which are concerned with the organization of a given farm, the objective of a land utilization study is to determine the primary uses of land as between farming and other possible surface uses, particularly forestry and grazing. Also when the point of view is the utilization of land within a nation or region as a whole in its relation to national or regional re-

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association held at Washington, D.C., December, 1927.

quirements for food or fiber, and to general national objectives such as military security, economic independence, or a sound balance between agriculture and industry, the project may be considered in the field of land utilization.

There is a large amount of basic qualitative and statistical data for land utilization studies. The results of geological and soil surveys, Weather Bureau data, reports of district foresters, reports of conservation commissions, many agronomic and silvicultural studies, studies of grazing and other phases of livestock husbandry, reports of drainage and irrigation boards and commissions, supply a larger volume of grist than the land utilization mill has yet been able to grind. Considerable work has been done by way of organizing these data for generalized presentation. In the various folios of the Atlas of American Agriculture, the Bureau of Agricultural Economics, in co-operation with other departmental agencies, is making available a number of useful maps which provide a bird's-eye view of soils, native vegetation, and climatic conditions, highly generalized for the nation as a whole.

The greater elaboration of questions on land utilization in the census of 1925 affords a more ample statistical basis than we have had hitherto, and the Bureau of Agricultural Economics is obtaining annual data on utilization of land in its rural route surveys. The graphic summaries and analyses of census data on the uses of land made in various studies by the Bureau of Agricultural Economics have contributed much to a better conception of national and regional tendencies in this field. The United States Forest Service has recently issued a comprehensive manual of forest and lumber statistics of production, prices, distribution and trade; but there is still lacking any accurate statistical information of the area and stand of timber in the United States. A project for a detailed census of timber stand has been urged by a number of organizations for years, and may come before the present Congress. The resulting data would be of the greatest value both for national and for local studies in land utilization.

The nation as a whole is interested in finding an answer to certain important questions connected with the relation-

ship of land supply to requirements, such as: How adequate is our land area to meet the needs of increasing populations? What proportions of our surface should be devoted to the several uses—farming, forests, extensive grazing, parks, etc.? What is the need for expanding the area of farm and of crop land in the next few years? The Bureau of Agricultural Economics has made one study which involves an attempt to give tentative replies to these questions. The recently established Committee on Bases of Land Policy is carrying on a somewhat similar study of national land uses, requirements, and resources. The work of Raymond Pearl, E. M. East, and various articles by O. E. Baker have stimulated interest in the relationship of food supply to population. However, the available data are at present so meager and imperfect that the results of these studies should be regarded as mere approximations to be refined and modified as new data and changing conditions make necessary. In fact, further refinement is dependent on specific research projects to throw light on dark spots in our basic data, such as to determine the areas of various classes of land, the trends in consumption and their bearing on land requirements, the present and probable trend in productive efficiency in its relationship to economy of land, probable influence of competing areas outside our national boundaries as determined by their available resources and by trade policies, etc. The Bureau of Agricultural Economics has done some work on these subjects and the Food Research Institute has also contributed to our knowledge of consumption trends. The studies of population by Warren Thompson, Walter F. Wilcox, by Louis I. Dublin, and other workers are contributing a more refined conception of the trend of population in its relation to land resources. As a result of the work already done the population bugbear appears to have been largely allayed, and the problem of land supply in the immediate future appears to take the form not of how to adjust ourselves to a scarcity, but rather, of how to select wisely for utilization and how to avoid the tendency toward excessive agricultural expansion, with its resulting unfortunate influence on income.

It is obvious that an intelligent national outlook on the

relationship of land resources to requirements is important also as a background for the formulation of local or regional policies of utilization; however, such an outlook is not indispensable in order that local programs of research in land utilization may go forward. There are immense areas of land in this country concerning which there is much vagueness as to the economic possibilities. This vagueness is the basis either of inertia or of unwise programs of utilization, both individual and collective. It is in these regions particularly that the problem of the submarginal farmer is most acute.

Considering the magnitude and importance of this problem, it is surprising that so little research work in this field is being carried on by State experiment stations. Of course, there are many specialized technological projects in these regions, which contribute important segments of information of economic significance, but there have been but few synthetical studies designed to provide the basis of an intelligent program of utilization.

Connecticut Experiment Station, in co-operation with the Bureau of Agricultural Economics, has made a somewhat novel study of the economic significance of soil types in the Connecticut Valley. Farm survey data definitely related to soil types were supplemented by Census township tabulations, and by data on the location of milk production obtained from Connecticut Milk Producers' Association. The project may be regarded as primarily a study of the relation of the selection of farm enterprises and practices to geographic environment.

Ohio Experiment Station, in co-operation with the Bureau of Agricultural Economics, the Cornell Experiment Station, have recently made farm to farm surveys in marginal and submarginal areas, supplemented by studies of census data, tabulated in some cases by townships, material on historical background, etc. Other such studies have been made in the Lakes States and Pacific Northwest in the past few years. In general, these studies have afforded a picture of farm organization, practice, income, and standards of living, and have indicated the economic significance of the farm woodlot and outside employment in lum-

bering. In some cases they have afforded information useful for extension purposes. However, they fall short of providing the data necessary for a regional program of land utilization.

The comprehensive studies being carried on by the Forest Service on the subject of forest taxation will provide data on an important segment of the problem of land utilization.

A most interesting and extensive experiment in the methodology of land classification is the Michigan economic survey. Based on a comparatively small area, a county at a time, these studies have assumed a very intensive character. Field agents visit every quarter section of land and catalogue various facts with regard to its physical characteristics and present use and physical suitability for various purposes. The survey provides a detailed and reasonably accurate body of data on these subjects. However, the study is long on physical data and short on economic data, and particularly lacking in a synthesis of relevant facts involved in formulating an economic judgment which may become the basis of action.

Several years ago the acute economic conditions in the northern Great Plains area prompted a movement in the United States Department of Agriculture and some of the States concerned to promote an encyclopedic study of the problem of land utilization and agricultural production in the spring wheat States. A number of useful colored maps were prepared showing physical conditions, and the classification of the land based on the work of the Land Classification Board, of the Geological Survey. A number of farm management and settlers' progress surveys were made in selected localities; but these were not sufficiently numerous or comprehensive to afford the economic data necessary to formulate a program for the region as a whole.

A land utilization study capable of providing a definite program must be confined to a comparatively small region, a few countries at most, and must be aimed at determining the economic possibilities and methods for particular forms of utilization. Two experiments in the methodology of projects of this character are being carried on by the Bureau of Agricultural Economics in co-operation with the experi-

ment stations of Colorado and West Virginia, and, in the latter case, also with the United States Forest Service. The Colorado project is largely marginal as between farming and extensive grazing, and is complicated by the problem of the public domain. The West Virginia project involves the most economical allocation of the mountain lands as between forestry and grazing or both uses in combination, the co-ordination of these uses with the farming systems of the relatively narrow valleys, and the stabilization of the retrograding lumber industry and the dependent small town.

Growing out of these objectives are such questions as the following: What existing farms should be abandoned, and how can the families best be evacuated from the region? What farming areas now unprofitable can be revived by a radical readjustment of boundaries, proportions of land involved, capitalization, and organization? What credit facilities would promote such changes? How can the unwise development of new farming enterprises be prevented? What are the economic advantages of the farm woodlot and what should be its relation to the farm economy? What is the present tax burden on forest lands and what is its relation to the utilization of land for forests or other purposes? What modifications in the tax burden would be necessary to make private forestry profitable and what are the practicable changes in rates of assessment, in expenditures, in the distribution of burden between various tax bearers and tax jurisdictions? What method of forest management appears to be most advantageous under existing conditions or practicable changes therein? What areas could be advantageously devoted to public forestry or to parks and other public uses? What are the respective advantages of particular areas for extensive grazing or for forests and what co-ordination of the two uses appears desirable? How can farm enterprises be co-ordinated with available employment in forests especially in winter? What is the relationship between existing and prospective modes of utilization and the population and industries of dependent towns and villages? What is the relationship of land utilization to the available economic and social utilities of the region—such as railways, roads, schools, etc.?

Land Reclamation and Settlement

Much of the research work in this field consists in projects designed to determine the economic feasibility of proposed land settlement projects, especially those involving reclamation. More or less casual initial research with this objective in view is carried on from time to time by private enterprises planning to embark in reclamation and settlement. Somewhat more systematic and searching in many instances is the work of some of the administrative agencies set up in a number of Western States for certifying the bonds of reclamation enterprises. While generally considerable study in such projects is devoted to the engineering and agricultural feasibility of proposed projects, some of the work has been lacking in the facility with which the economic significance of the data has been appraised, particularly in regard to allowing for prospective trends in basic economic conditions. A somewhat similar conclusion, in my judgment, applies to the preliminary investigations of projects which in recent years have been made under the auspices of the Federal Bureau of Reclamation by means of special investigating committees.

Comparatively little research work is being carried on in this country which will provide an understanding of the larger aspects of land reclamation and settlement and the basic principles involved, as distinguished from the merits of a particular project. The special inquiries with respect to irrigation and drainage in the censuses of 1910 and 1920 provide extensive statistical information on a small range of subjects. A good deal of statistical data concerning Federal Reclamation Projects has been assembled by the Bureau of Reclamation, and the necessity for financial reorganization has resulted in assembling of additional data regarding the internal economy of projects. The Report of the Fact-Finding Commission several years ago constituted a systematic and apparently judicial analysis of the status of Federal reclamation. A bulletin issued by the Bureau of Agricultural Economics brings out in a striking way the extent of subsidy involved in the exemption from interest on construction costs. A joint study by the Bureau of Agricultural Economics and Public Roads shows the overdevelop-

ment of drainage enterprises and the serious financial consequences resulting. The California Station is doing some careful research work on the economic status of various reclamation projects and has recently issued a bulletin on the subject. Two or three significant books on the subject of irrigation economics have appeared.

Only one experiment station, Minnesota, reports a land settlement project. This is in co-operation with the Bureau of Agricultural Economics, and in the earlier phases of the project, with Wisconsin and the University of Michigan. A bulletin has been issued dealing with the kinds of land settlement agencies, their methods, and the extent of success achieved as measured by the progress of several thousand settlers. The various factors affecting the success of settlers is being analyzed by multiple correlation. Studies of somewhat similar character were carried on some years ago in northern Wisconsin by representatives of the Department of Economics and the Experiment Station of the University of Wisconsin. A doctoral dissertation under way in the same institution bears the suggestive title "Grub-Stake Settlement in Northern Wisconsin," based on an experiment station project which is on the border line between a land utilization and a land settlement study. The Bureau of Agricultural Economics is studying the policies of the various states in promoting and regulating land settlement. A considerable number of farm surveys in reclamation projects or other newly settled areas have assembled significant data as to income, financial progress of settlers and farm management methods and practices, but these studies have not been primarily aimed at the problem of settlement.

In spite of the various lines of work mentioned, our knowledge of the land settlement and reclamation situation is still woefully scrappy and inconclusive on such matters as the extent of activity in private land settlement, and by different types of agencies; the variation in rate of settlement at different periods; the proportion of settlers who drop out or fail and the causes and consequences of failure; the present effectiveness of various types of State regulation, including the real estate boards and "blue sky" laws; types of credit adapted to land settlement; the desirability

of continuance of government reclamation, and the applicability to American conditions of the vaunted colonization systems of foreign countries as, for instance, Australia and Canada in trans-marine colonization, of Germany in inner-colonization, and of England and Denmark in resettlement under small holdings. About some of these experiments we sometimes get suggestions that all is not as ideal as some of our Utopians would have us believe.

Land Tenure

Most students of agricultural economics are familiar with the various descriptive studies of the landlord-tenant contract made from time to time by several experiment stations and by the Bureau of Agricultural Economics.

In a number of instances these descriptive studies have been amplified by survey data showing for a single year the distribution of capital investment, income and outgo between the two parties. In a number of States these studies have been made the bases of landlord-tenant conferences for the purpose of affecting equitable adjustment in relationship. However, financial data covering a single year, though valuable as a basis for formulating hypotheses and inferences, affords no sound basis for determining the fairness of the contributions and receipts of the respective parties. Most continuing surveys involve mainly farms operated by owners, and so far as I am aware, the continuous farm management surveys and cost records on tenant farms being maintained by the Illinois, Iowa, and Kentucky Experiment Stations represent the only projects which promise ultimately locally significant analysis of the financial aspects of the landlord-tenant contract.

A considerable number of surveys, supplemented at times by census data have supplied a good deal of material revealing the contrasts between farms belonging to various tenure classes in such matters as amount of capital, net worth, expenditures, education and literacy, social relationships, etc. While such descriptive studies are valuable so far as they go, there is a growing disposition to recognize that form of tenure is but one of many complex factors responsible for these contrasts. It is possible that form

of tenure is more largely responsible for contrasts in farm organization and practices than for some of the other characteristics in the manner of life of farmers. Various dogmatic conclusions are widely current, as that tenancy makes for soil exhaustion, that owners tend to operate farms of inadequate size, etc.; but no thorough-going study of the subject has yet been made in America.

The concept of the system of tenure as an agricultural ladder, facilitating progress toward ownership and sorting men in accordance with their several abilities personal and financial has given direction to a considerable amount of past investigation and some current research. Census data provide a picture of the period of time spent in various tenure stages by the operator reporting. Such data provide a picture of the steps and time required in moving up the tenure ladder, but attempts to determine changes in rate of climb have given specious results because of the difficulty of allowing for influence of mortality and retirement. While mortality tables have been employed in studies made in the Bureau of Agricultural Economics and in one or two experiment stations, no adequate data on age of retirement are available. A number of surveys by States and by the Bureau have provided statistical information as to the mode by which the ownership of farms is acquired, whether by inheritance, gift, purchase, etc., and the Bureau is now obtaining this information annually for the country as a whole with respect to the current turnover of farms. Acquisition by inheritance may be direct or it may be indirect through the use of wealth inherited to purchase a farm. Thus an adequate study of the process of acquiring ownership necessarily involves a study covering a period of years of the processes by which farmers get ahead financially, including direct or indirect acquisition by inheritance, gift, or marriage, by saving, increase in land values, and other fortunate investments. One such study has been made by the Bureau of Agricultural Economics, although not yet published. A few years ago a study at the University of Wisconsin employed the significant methods of studying the tenure history of the farm.

At the present time two very intensive studies from the

point of view of the "agricultural ladder" are being carried on by the Institute of Land Economics and Public Utilities in two selected townships, one in a county in northern Illinois having a high percentage of tenancy and the other in a township in eastern Wisconsin having a high percentage of farms operated by owners. The tenure history and financial history both of the farmer and of the farm are being obtained and the surveys are supplemented by the study of census schedules back to 1850 and by data from files of county newspapers and histories. This intensive study promises to be fertile in the formulation of hypotheses or the confirmation of old ones, although the small geographic scope will not permit wide generalizations. A practical experiment in dealing with the problems of the tenure "ladder" is the well known project of the Fairway Farms Corporation, in Montana.

Census statistics provide a basis for studying the period of occupancy of farmers in various classes of tenure, but the fact that the period of occupancy is not ended at the time of reporting has led the Bureau of Agricultural Economics to obtain supplementary data by means of questionnaires and surveys. Some study has also been given by the Bureau to the motives and conditions that are responsible for the relative instability of farm occupancy in this country.

The ownership of rented farm land in the United States was studied in 1900 by the Census Bureau and in 1920 by the Bureau of Agricultural Economics. These data afford fairly sound conclusions as to degree of concentration in ownership, the extent of absenteeism, occupation, age, and experience of landlords, and their relatedness to tenants. On the last subject comprehensive data are provided in the recent census of agriculture.

Various farm management studies have dealt more or less adequately with the efficiency and profitableness of large-scale versus small scale farming, but in this country comparatively little attention has been devoted to the larger land-economic aspects and implications of the question. The Bureau of Agricultural Economics has made a study of the organization of a large farming corporation in eastern North Dakota. The Bureau is also making a study of the

census schedules of farms of one thousand acres or over, with a view to determining their location and reported characteristics. It is necessary to omit Southern plantations because of the difficulty of identifying them, a difficulty which was overcome in 1910 by the employment of a special schedule which provided our only plantation statistics.

The plantation system, has been undergoing a process of transition for several decades, but especially rapidly since 1920, and we badly need more information about these tendencies. The Bureau of Agricultural Economics made a study several years ago of the economic aspects of plantation management. The serious ravages of the boll weevil and other unfortunate influences, particularly serious in middle Georgia and northwestern South Carolina, have led the Bureau recently to study the land tenure and land utilization changes and tendencies in these regions. It appears probable that research in the forms of land tenure best adapted to the rapidly changing economic and social conditions of our present period, and particularly as to the economic forms and possibilities of estate management, should partly be carried forward by experimentation.

One of the most important economic problems in American agriculture is that of enabling small negro and white tenant farmers of the South to attain a sounder economic position in relation to land, capital, and managerial efficiency, and to achieve a higher standard of living. A considerable number of studies of negro problems have been made, some centering largely on standards of living and housing, others on the economic characteristics and position of negro tenants. Important studies of this character have been inaugurated by the new foundation for social research at the University of North Carolina. The status of small white tenant farmers has been much less adequately studied. Significant data, concerning this class, were published some years ago by the University of Texas and Texas Experiment Station and more recently for North Carolina. During the past year the Bureau of Agricultural Economics has made a local survey for the purpose in northern Georgia. The Oklahoma Experiment Station, in co-operation with the Bureau, is carrying on comprehensive studies of the status

both of negro and of white tenants, particularly from the points of view of financial and tenure progress, stability of occupancy, and conditions of progress to ownership.

We have a number of important treatises dealing with the history of the public domain. A most acute current phase of the problem of the public domain is presented by the economic anarchy which prevails with reference to the great areas of the public domain employed for grazing. The frequent failures of Congress to pass legislation on the question are attributable to the diversity of conditions which make it futile to deal with the problem by a single formula. For this reason the Bureau of Agricultural Economics is undertaking to determine what are the type situations, with particular reference to Nevada, which contains about one-third of the remaining unreserved public domain.

Land Values and Valuation

The Bureau of Agricultural Economics has recently issued, after careful study, an index of the value of farm real estate running back to 1912, and continued as a current series by reason of information supplied by crop and livestock correspondents and real estate men. The Bureau, in co-operation with a number of States, has attempted to supply the need for longer historical series by obtaining data on sales from county records in about a dozen States. Some of the series extend back to 1850, and the work is under way of analyzing these trends and determining their relation to other economic trends such as taxes, net rentals, prices, wages, interest rates, yields, gross and net income, etc. Two experiment stations report current activity on this project. Michigan is carrying on a similar project, on the basis of data from public officials and abstract companies, supplemented by personal visits to the farms in order to ascertain their characteristics.

Determination of the influence on value of various characteristics and peculiarities of individual farms comprises a significant line of research. In general, two methods of study are applicable: (a) the study of the use value of particular types of improvements as indicated by rental or net incomes from operation, and (b) application of multiple correlation

to large groups of farms, each of which is characterized by a particular type of improvement. To a certain extent data have been contributed on this subject in connection with studies of the feasibility of prospective reclamation projects, but the general relationships indicated are yet to be determined. The Bureau of Agricultural Economics and the Minnesota Experiment Station, have been working on a study of the influence of land clearing and various other conditions on the value of farm real estate in the northern Lakes States, employing the method of multiple correlation to analyze the relationship indicated by data obtained partly from questionnaires and partly from Census schedules. Similar methods are being employed by the same Bureau in co-operation with the Bureau of Public Roads in analyzing survey data obtained in co-operation with Indiana, Wisconsin and Iowa, with a view to determining the influence on real estate values of such factors as type of road, yields per acre, proportion of crop land, type of buildings and nearness to market. One of the most comprehensive studies of this character is underway at the University of California in co-operation with the Federal Land Bank of Berkeley, the principal objective being to determine the relationships between value of farm real estate and the various physical differences, of soil, topography, temperature and rainfall in a state characterized by great diversity of physical conditions and of land values. The addition to land value attributable to orchards of various ages and kinds of fruit is another neglected phase of research.

The relation of the value of farm land to the income is important as a means of determining such questions as rate of capitalization, amount of expected increment or decrement allowed for, relation of values to earnings gross and net. The Bureau of Agricultural Economics has published a comprehensive study of the relationship of cash rentals to land values, based on the census of 1920, and is making a similar study for 1925. The relation of share rentals to cash rentals and to land values also should be determined.

All of these lines of research will contribute to the understanding both of the relationships and the methodology involved in developing a more effective process of land appraisal.

RESEARCH IN FARM TAXATION[1]

ERIC ENGLUND

UNITED STATES DEPARTMENT OF AGRICULTURE

I.

Public interest in farm taxation has been stimulated in recent years by mounting tax levies and by comparatively low income in agriculture. Evidence of this interest is found in the attention given the subject by individual students of public finance and by semi-public institutes and research foundations, and in the fact that it has become a separate field of investigation in both State and national institutions.

The Federal Bureau of Agricultural Economics is making estimates of taxes paid by farmers in various states, conducting detailed studies of the relation of taxes to income on cash-rented farm land in several parts of the country, and co-operating with six States in research in this field. On December 15 of this year Agricultural Experiment Stations in 14 States had active Purnell projects in farm taxation, and at least five more States were including some phase of it as parts of other investigations not designated as taxation projects. Some of the State tax commissions are sponsoring certain general studies which have a bearing on farm taxation. Thus we may expect much new material on this subject in the next few years.

II.

The research done to date, if one may judge by published reports, has been confined, with minor exceptions, to assessment and equalization, and to the relation of farm taxes to the value of property and income in agriculture. Certain comparisons have been drawn with urban taxes. In a few cases effort has been made to ascertain the proportions of the total increase in farm taxes due to increased levies for the various political units—county, township, school district, etc.—and for the major public purposes, such as education and road construction. This has directed public

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

attention to the farmer's tax problem, and has afforded an authoritative basis for the conviction, held by at least one-third of the population before the investigations were begun, that farm taxes are high and that "something ought to be done about it."

Reports of these studies have included the usual criticism of the general property tax as unsuited to modern conditions, notwithstanding the merits it may have had in earlier times. Tax revision in the interest of the farmer has been recommended by many. However, such advocacy needs a stronger foundation in research, even at the risk of modifying the reformers' point of view. Little has been done in analyzing expenditures, and almost nothing has been attempted in that part of the subject which has to do with economical use of the farmer's "tax dollar." Moreover, in the broad and intricate field of group relation in public expenditures and taxation, there is practically nothing of a scientific character to throw light on the farmer's present position in our fiscal structure.

III.

Economy in local expenditures is always popular in the abstract; but concrete effort to accomplish it usually falls far short of unanimous approval, because it affects somebody's job, and because projects of special interest to this or that group, or to the community as a whole, seem more important than lower taxes. Sporadic effort to be economical often takes the form of parsimonious and short-sighted retrenchment, which serves little purpose beyond securing temporary publicity.

The possibility of providing the necessary public service and improvements at less cost is a challenge to research. Where, precisely, is the "waste of the taxpayer's money," which is so glibly asserted by the stump speaker? Orators, editorial writers, and cartoonists have at least hinted that it is appallingly great. Where, how, and to what extent, is money wasted in local expenditures? Research to find an answer would certainly be useful, even should it disclose less preventable waste than is commonly supposed to exist.

Studies in the organization of local governmental units

from the standpoint of economy of public expenditures might suggest possibilities of reorganizing, and perhaps of combining, some of these units in the interest of more effective and more economical local administration. It might be possible to devise and install suitable systems of budgeting and of accounts in local governmental units, to give the voters a better understanding of the uses of their funds, and to make public scrutiny more effective. Much emphasis has been placed on the taxpayer's watchfulness as a means of keeping expenditures in check. Yet, taxes in recent years have increased with great rapidity in local units where taxpayers presumably had the best opportunity to scrutinize expenditures.

This apparent ineffectiveness of public scrutiny is not easily explained. The desire for better service and more improvements may be greater than the desire for lower taxes. Published accounts of expenditures may have been insufficient, and the precise meaning of proposed community enterprises in terms of their effect on tax levies may not have been made sufficiently clear to the voters. The inclination of a community to put a premium on the present and to discount the future, i.e., the rate of collective time preference, may be so great that communities have been induced to go to the extreme in exercising their power to issue bonds, or otherwise to mortgage future revenues for immediate enjoyment. Since the right to vote is more widely distributed than the duty to contribute directly to the support of government, voters who pay taxes unconsciously, if at all, may impose higher levies than taxpayers would allow were the decision left to them alone. Moreover, the theory of public scrutiny as a check on expenditures may be based on excessive confidence in democratic control of public affairs.

Whether State and local taxes have risen too rapidly in recent years, and the old question of whether the right to vote should be in any way conditioned on the payment of taxes, are mentioned only to suggest the importance of research to throw light on the factors that make public scrutiny more or less effective in the control of expenditures.

It would be of real public service to ascertain specific

reasons for rapidly mounting local taxes. For instance, to what extent are taxes rising because of competitive expenditures? Communities that are anxious to satisfy their pride, and to assert their will to excel, may find less expensive means of doing so than by that competition which often takes the form of municipal colleges in small towns, costly improvements of various kinds, and other enterprises which satisfy the ambition of chronic boosters and gratify a more or less well-founded community pride. It may be possible by research to contribute to a clearer understanding of our standard of values in public expenditures. For example, monumental school buildings, which contribute greatly to the increase in taxes in some communities, may not be necessary to a high standard of public instruction.

Competitive expenditures and expensive community pride are probably more prevalent in urban than in rural communities. Nevertheless, high taxes on city property may have a closer relation to the farmers' tax problems than is commonly supposed.

Research in farm taxation has paid little attention to benefits derived from public expenditures. This neglect is probably due to the fact that it is easier and perhaps more popular to measure taxes than benefits. While the latter may defy all effort at accurate measurement, it clearly falls within the scope of research in farm taxation to recognize the fact that improvements and services paid for by taxation are additions to the standards of living of the community. This phase of our problem becomes increasingly important with the growth of the service functions of government.

In farming as in other industries, taxes are counted as a cost of production. This is correct in the sense that taxes are an unavoidable levy on the land, buildings, livestock, and equipment of the individual farm. But taxes are a consumption item as well as a production cost; they are not only a burden but also confer a benefit.

Notwithstanding the compulsion which the individual taxpayer is under, the increase in taxes is a matter of the collective choice of many individuals constituting a community. Despite the shortcomings of public scrutiny as a

means of controlling expenditures, taxes have on the whole increased, not only because prices and wages have risen, but also because the people have chosen that Government should do more and more for them. Therefore, in our studies of agriculture *en masse,* we should consider farm taxes not only as an expense of production, but also as a consumption expenditure. To do this, it may be necessary to revise our thinking in certain particulars. This is difficult for we were born into a community rendering many and increasingly important services which we have come to take for granted.

It seems to have become fashionable to say less about benefits than about burdens. To expound the latter helps to strengthen our case in the court of public opinion. Yet, it is the duty of the research worker to consider both phases of taxes—the burden and the benefit. To be sure, opportunities are few for statistical measurement of advantages that flow from public expenditures, but the investigator might well endeavor to apply exact and courageous reasoning to the more intangible phases of these problems, as an aid and a supplement to the statistical method.

IV.

As has been pointed out, research in "farm taxation" has concerned itself mainly with assessment and tax levies and comparatively little has been done on problems of expenditure, and of group relationships. For the present purpose the latter field—group relationships—is assumed to include: (1) the diffusion of benefits of public expenditures, and (2) the shifting and the incidence of taxation, as they affect the farmer's position in our fiscal system. These intricate and controversial subjects are mentioned in an effort to suggest the importance of including them in a comprehensive research program. Such a program must be broader than the term "farm taxation" implies, even should it be necessary to retain the name itself for administrative expediency.

In public finance, as in other phases of our economic life, the increasing interdependence of individuals, and of various parts of the nation, intensifies the complexity of group relations. Price-making forces exercise their influence over

wider areas and the movement of population is more extensive than formerly. This interdependence suggests that expenditures for certain public services and improvements —schools, roads, etc.—in one part of the country may be of greater significance to the other parts than is generally realized. For instance, it is by no means certain that rural schools are so exclusively local in character that they should not be supported in part by taxes levied on larger territorial units.

The number of children of school age is greater in rural than in urban communities, relative to total population. Rural communities, therefore, bear the cost of educating a proportionately greater number of the rising generation. As a result of migration from the farms to the cities, and from one section of the country to another, every child in the rural schools is a potential citizen of some urban community and of another State. Hence, there are reasons for believing that the cost of rural schools should be borne jointly, to a greater extent than at present, by taxpayers in larger jurisdictions.

In considering the question of a wider diffusion of taxes as a research field, the administrative problems of levying a greater share of our taxes on larger governmental units for the aid of local units, should not be overlooked. Objections to the subvention of local improvements and services by the State or by the Nation, and the danger of creating expensive administrative machinery and unwieldy bureaucracies, are not all mythical. There is also the danger that new levies will become merely additional taxes and not a relief to local property owners. Again, this indicates the necessity of devising systems of budgeting and of accounts as aids in controlling expenditures.

The growing economic interdependence of persons, groups and sections of the country is related to another set of problems affecting the farmer's position in our fiscal structure. With the growth of the economic unit—the area over which price-making forces exert their influence—and with the advance in tax rates in general, it is reasonable to assume that increasing amounts of our taxes are paid by persons from whom they are not collected by the Govern-

ment, and who may reside in distant parts of the country.

Of all producers, farmers are probably least able to shift their taxes, which are levied on the assessed valuation of farm property, of which land is the principal item. Since taxes are shifted through prices of products and of services, the land tax could not be passed on to the consumer unless it affected the quantity, and consequently the price, of farm products. As taxes approach the point of absorbing the net income from a given piece of land, it is likely that the owner will seek to put it to a higher use, if to do so holds any promise of greater income. This was illustrated by a Corn Belt farmer a few years ago, who said, on being asked why he was clearing land to produce more corn: "I am clearing this piece because I can't afford to keep it in brush and pay the taxes on it."

It is not known, and may not be ascertainable, to what extent rising taxes have forced land into higher use in the past ten or fifteen years. However, it should be possible by careful reasoning, and with such help as statistics may give, to clarify the question of whether or not the prevailing system of levying taxes on the capital value of land serves to increase, rather than to diminish, the quantity of farm products offered in the market.

An equally challenging subject for study is the possibility that an important part of the taxes collected from industrial and commercial groups is shifted to the agricultural population. Taxes levied on all enterprises in any industry tend to eliminate the marginal producer, and thereby to affect supply and price of the product. If taxes levied on intramarginal concerns take so large a part of their revenue as to retard industrial expansion, the output will be less and prices presumably higher than if taxes were lower. For instance, there can be no doubt that taxes levied on railroad properties and made a part of the basis for rate making, are in varying degrees shifted forward to the consumer and backward to the producer of the goods handled by the railroads.

Real estate taxes in urban communities are often, if not usually, higher in relation to the selling value of the property than in the surrounding rural districts. For example,

the average tax on city real estate in Kansas in 1923 was nearly 2.3 per cent of selling value, while the corresponding figure for farm real estate was slightly above 1 per cent. In the same year the assessed valuation of urban improvements was 64.3 per cent of the total valuation of all city real estate.[2] An advancing urban tax rate surely retards improvements until rents are sufficient to yield competitive returns above taxes. Are not these taxes paid by those who occupy the houses and by those who patronize the stores and shops? The rural population represents a large portion of this patronage and probably pays an important part of the taxes levied on improvements in cities and towns.

The shifting of taxes has been emphasized in recent years in efforts leading to successive reductions in the income tax and other Federal levies. As a result of these revisions, few farmers pay taxes direct to the National Government. In appealing to the country to support tax reduction, it has been emphasized that an important share of the Federal taxes are, in fact, paid indirectly by the people at large, including the farmers. This is pointed out by Secretary Mellon in his book, *Taxation: The People's Business.* He says:

> "A sound revision of taxes should aid materially in reducing the cost of living. High taxes have always meant a high price level, for the taxes are paid, in a large measure, by consumers all over the country and not alone by persons actually giving their checks to the Government. No thoughtful person longer doubts that, irrespective of his income, he pays a part of the high surtaxes in the general high price level.'"[3]

This and similar argumens not only show why the masses should support tax reduction, but are helpful to a better understanding of the farmer's position in our tax structure as a whole. It cannot be contended that high surtaxes and corporation taxes are shifted to the people at large without admitting that farmers are, in fact, paying more taxes than their tax receipts show, especially since it is generally conceded that taxes on farm land are not shifted.

Whatever may be the farmer's true position in our whole revenue system, a careful analysis of this complicated ques-

[2] Kansas Agricultural Experiment Station Bulletin 235, "The trend of real estate taxation in Kansas from 1910 to 1923."
[3] Mellon, Andrew W., *Taxation: The People's Business* (Macmillan, 1924), p. 135.

tion of the shifting and the incidence of taxation is important, not only to a better understanding of the farmer's tax problems, but also to any comprehensive explanation of the simultaneous phenomena of high taxes, agricultural depression, and commercial and industrial prosperity in recent years.

V.

It would be out of the question to recommend a fixed method of study for any group of research problems mentioned in this paper. But, in conclusion, a few comments on method may not be out of place.

A number of studies in farm taxation have been made on a state-wide scale, resulting in general averages for wide areas. It should not be inferred that investigations of this type have been carried too far or even far enough. But, while the results are helpful in showing a general trend they should be supplemented by more detailed research. A well-trained investigator capable of raising pertinent questions, and of developing significant hypotheses, and free to follow every promising lead in the progress of his research, should be able to make important contributions to "farm taxation" while confining his efforts to a single county or homogeneous community.

Data assembled by various governmental research and administrative agencies contain more material for fruitful research in this field than is generally realized. These sources, which are often overlooked in the quest for "original" data, should be utilized more fully in our investigations of the farmer's tax problems, for the object of research is, after all, not merely to assemble new data, but to find new meaning. Moreover, there remains, outside of the present scope of quantitative research, a large field for theoretical analysis. For instance, the diffusion of benefits of public expenditures, and the shifting and the incidence of taxation must be explained largely by hard reasoning.

Projects have been drawn up and work begun in some States, duplicating studies in progress or completed elsewhere. This is justifiable for a time, on the ground that studies of the same kind in various sections of the country may yield results significant for each section. However, the

time is ripe for a definite advance beyond this stage. We must seek to build upon, not merely to duplicate, the work already done. "Farm taxation" must be broadened to include public expenditures and taxation in their relation to agriculture. This widening of the field demands of the investigator, not only fundamental training, but also a high degree of tolerance of points of view other than his own, and an objective attitude toward group controversies and public policy.

Discussion by F. P. Weaver

Pennsylvania State College

I wish especially to commend the paper just read for the manner in which the outstanding problems are pointed out and since this was done rather comprehensively I wish simply to stress a few of these.

My viewpoint is, no doubt, somewhat colored by conditions in Pennsylvania and the problems to be solved in that State since those are the problems about which I have been thinking.

No doubt, a comprehensive outline for research in rural taxes will be helpful in all States even though adaptation to the conditions in each state is essential.

On the determination of "the farmer's present position in our fiscal structure as a whole" a great deal of intensive study is needed. This involves not only the farmer's share in the tax burden in comparison with his ability to pay, but also the farmer's opportunity to profit by the expenditure of public moneys. Under Pennsylvania conditions the bulk of the farmer's tax is spent for roads and schools, roads using over 32 per cent and schools 45 per cent. Not only is the bulk (77 per cent) of his tax used for these two purposes, but he carries a share in these taxes out of proportion to his share in the State income. With only 3.7 per cent of all income in the State going to farm people, they pay 37.25 per cent of all road taxes, levied as such, and eight per cent of all school taxes, levied as such. (These figures do not include appropriations from State taxes for these purposes.)

Under modern methods of transportation and under present day methods of securing the necessary food for town and city populations, is it sound to assume that the farmer has any greater interest in or any greater responsibility for the building of roads than has the city dweller, whose very existence, as well as a part of whose recreation, is dependent upon transportation over these highways? Should a greater burden of road building rest upon the farmer because he needs roads to get to the town to do his purchasing than upon the merchant in the town whose business is dependent on these buyers?

The question raised by Mr. Englund as to where the responsibility for rural schools should rest is a very pertinent one, especially in Pennsylvania. In these rural sections where the school tax is most burdensome, children are very clearly being educated for the benefit of other sections since it is from these sections that the migration of young people is greatest.

Preliminary reports from the membership of such service clubs as Rotary, Kiwanis and Lions which may be assumed to furnish a fairly adequate cross section of the leadership in the business and professional callings of the towns and cities in the State, indicate that about 40 per cent of these men received their common school education in rural schools. If the cities are depending upon the rural schools to educate so large a share of their future leaders, then their interest in rural schools is not merely an altruistic one.

In measuring the farmers' share in the total burden of tax payment, it does not seem adequate to compare taxes on farm and town property since intangible property has come to constitute such a large portion of our income-yielding wealth and this intangible property seldom carries its full share of taxation, partly because of inadequate tax laws and also because of administrative difficulties. If a fair appraisal is to be made of the relative tax burden on farmers, it would seem to be highly essential that all incomes in the State be catalogued and classified and the relative tax burden against each determined. In this connection, some work should be done to determine a sound ratio between taxes on property income and taxes on personal income. It is not sufficient to know that the farmer is taxed too heavily, but we need to know, also, to what extent other groups are escaping their fair share of the tax burden and which these groups are. Some of our work to date indicates that the farmer is not alone in this grievance and while a study of rural taxation may not, under a strict interpretation, involve these other groups, relief from excessive taxation may come much sooner to the farmer when all groups who have the same grievance can be informed, so as to interest them in working in a common cause.

Studies in farm taxation should disclose not only the facts about which the farmer has a right to be dissatisfied, but they should attempt, also, to throw light on what the farmer gets in return for his tax payments. It is possible that much of the discontent resulting from rising taxes would disappear if research would show that the collective expenditure of this money secured greater benefits to the individuals who paid the taxes than they could possibly have secured by expending the same amount individually. Careful research along this line is needed, also, in order to indicate how far the trend of collective rather than individual spending may reasonably be expected to go or how far it should go for the best interests of all people.

HOW THE AGRICULTURAL-COLLEGE STUDENT SHOULD BE INTRODUCED TO THE SUBJECT OF AGRICULTURAL ECONOMICS[1]

G. F. WARREN

There is, of course, no one fixed program that is the best preparation for work in agricultural economics. What is best is constantly changing. A discussion of this subject ten years from to-day may be very different from what appears best to-day. Before discussing any specific details about a course in agricultural economics, it is essential to know for what work men are preparing, and the work which is to precede the work in economics.

The variety of positions held by men with training in farm management, marketing, prices, statistics, and the like, is very striking. The preparation of such men varies from a study of farm managemeent in high school to the doctor's degree. I will first take up the desirable preparation for one who is to be thoroughly prepared, and then see what can be omitted if time is limited.

A phenomenal widening of scientific knowledge has occurred in the past generation. I can illustrate this best by some personal experiences. When I was a student in the University of Nebraska, my roommate needed a few extra hours, and took the agricultural course in one year in addition to his regular work. Contrast this with the multitude of courses now offered in an agricultural college. I recall a neighbor who entered a medical college without high school graduation at the time I entered the University. Two years later, he was a full-fledged doctor, practicing medicine in the home town. The law course was a two-year course, with very few prerequisites. Not many years ago, at Cornell, law and veterinary medicine were three-year courses, and medicine a four-year course. To-day, all of this is changed—the medical student takes eight years, plus a period of hospital service. Probably, even with this preparation, he has mastered a smaller percentage of the available medical knowledge than did the two-year men a generation ago. The law course takes from five to seven

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

years. Preparation for home-economics work formerly consisted of a sufficient command of the English language to say, "Yes"—even a foreign language was sometimes accepted. Now the four-year college course is over-crowded with subjects. The reason for these revolutionary changes is that science has progressed so rapidly in the past generation.

As knowledge widens, each subject is seen to overlap on all other subjects. A generation ago, a doctor would have laughed at the idea that a knowledge of entomology was desirable. A farmer would have wondered what relation psychology had to his work. A business man would have ridiculed the idea that statistics would help in his business.

As fast as the field of knowledge widens, there is a demand for the men who have the knowledge. There is always a shortage of adequately trained men. A few years ago, there was one kind of milk—just milk, plus some other materials commonly associated with cows. Today, there are grades C, B, A, certified, and modified. The higher requirements call for farmers with better training, and require trained men to handle the product. A few years ago, the president of this Association was a farmer who was producing modified milk. In the past year, I have known of three cases in which men with a doctor's degree in agricultural economics were offered three different types of positions in the milk industry, two of them at $10,000 per year. No one of the three accepted. The three places are still unfilled because there are no available men. A man with a four-year college course would be no better prepared for one of these positions than a doctor would be for his profession with such a course. Banks, railroads, commission firms, seed houses and fertilizer concerns, are calling for men with three or four years of work beyond college graduation.

New opportunities in farming have developed for highly trained men. The certified seed business, certified poultry business, and many other specialized types of farming, offer opportunities for men with training equivalent to that required for the doctorate.

Many of the most successful co-operative associations

are manned by graduates of agricultural colleges, and a number of them are looking for men with doctorates in marketing and farm management. The Federal Land Banks are beginning to look for such men.

The increasing clash between city and rural interests requires that thoroughly-trained men be on hand to represent agriculture, men as thoroughly trained as those who represent big business and other city interests.

The farm representative with an eighth-grade or high school training must be a genius if he is to make a good showing when he meets the trained men who represent the cities.

We no longer expect to choose high-school teachers from those who have gone to high school only. In the future, we should not expect to choose college teachers from those who have had college training only. For research and college teaching, all beginners should now have a full university course leading to a doctor's degree.

I shall, therefore, first consider the training required for the important positions previously outlined. Since this training will require from seven to eight years after graduation from high school, it is important that the student enter college before he is too old. For one who is to go to college, the training in foreign languages ought to begin before school age, but in any event should begin between the fourth and eighth grades, so that the student can read and speak at least one foreign language (preferably German or French) before entering high school. By merely delaying some of the reasoning studies not adapted to the earlier grades, at least one year's time can be saved. A speaking knowledge is required as well as a reading knowledge, because farmers and business men as well as professors who have such training, will travel in foreign countries. They are doing so now, but will travel much more in the future. You will recall the trip of the American Farm Bureau the past summer.

If it is known that a student is to take an agricultural-college course, it will be preferable that only a limited amount of agriculture be taken in the high school. Most of the specialization should come at the end of the student's

course. A limited amount of agriculture in the high school will help to sustain interest without displacing other subjects necessary for extended preparation.

For such a student, the college course should include history, psychology, mathematics, physics, chemistry, geology, meteorology, botany, bacteriology, plant psysiology, plant pathology, soils, genetics, entomology, feeding of animals, crop production, and farm mechanics. In the latter part of the course, when the student has something to say, he should have some training in public speaking and in editing and preparation of scientific manuscripts for publication.

Just as no large amount of agriculture is needed in the high school if one is to take an agricultural-college course, so no great amount of economics is needed in the undergraduate course if one is to do graduate work. It is better to spend most of the time getting a thorough training in the basic sciences, taking enough work in agricultural economics to sustain interest.

In the latter part of the undergraduate training, or during graduate work, there should be included courses in accounting, business management, money and banking, farm accounting, farm management, marketing of specific commodities, financing and management of co-operative associations, business law, prices, statistics, taxation and other public relationships of agriculture, rural sociology, and history of agriculture. Such a title as land economics might be included, but I believe that this subject matter is best presented by including the farm-management phases in farm management and the taxation and other political science relationships in courses dealing with public policy.

The total amount of course work here outlined can be done by a good student in six years. Seven years is better. At least one additional year should be devoted to a research problem, including statistical analysis of some economic problem and preparation of the results for printing. The person in charge of the thesis work should give intensive training in scientific English as well as in methods of research.

In addition to the type of training here outlined, one who

is to enter work in this field should have farm experience. This can be acquired by working on farms during summer vacations. A considerable number of agricultural students spend one summer or more traveling and working on farms in different agricultural regions. An even better experience is obtained by a number of students who take an auto and spend a summer and a term working their way across the continent and back. Another way of obtaining excellent experience, comparable with the hospital training of the medical student, is to obtain a position that permits travel in different parts of the United States on some specific piece of research.

I realize that many persons will say that such an adequate preparation requires too much time. My answer is that no more time is required than is necessary in preparation for medical work, and that the world is willing to pay for having time thus spent. A rapidly increasing number of men are making just such preparation.

There are two reasons for including such an extensive training in science. One is that the student be imbued with the scientific method so that it becomes second nature to him. Such methods have not been so highly developed in economics as in some other fields. The other reason is that a knowledge of science is needed.

A knowledge of mathematics is essential. The most common method of research in science is to set up a test which attempts to eliminate all forces except one, and measure the effect of this one force. Success is based on refinement in measurement. This method cannot be adopted in economics, hence economists often have followed the philosophers' method of "armchair" research. In the business world, it is usually impossible to set up two establishments or societies which differ in only one respect and thus determine the influence of this one factor. In business, the resultant of many forces is known. The problem is to analyze the data so as to determine the effect of each force. Such analysis requires data from a large number of cases and keenness in mathematical analysis. As long as noncompensating errors are avoided, it does not necesssarily require great accuracy in any one measurement. This strik-

ing difference from the usual methods of chemistry has resulted in a very common criticism of work in economics, particularly of the work in farm management where so much scientific work has been done. The probable errors of farm-management results compare very favorably with those in soils, animal husbandry and the like. It is clear that mathematical and statistical methods are of more importance in the field of economics than for most other sciences, hence the need of much work in mathematics.

Every price is a human reaction as well as an economic reaction. Probably no subject is more basic to economics than modern scientific psychology.

If one is to study land taxation, the first essential is that he understand soils. But he cannot understand soils without understanding geology, chemistry, botany, bacteriology and meteorology. Possibly he is planning to study the economic factors in the dairy industry. He needs to know something of the care and feeding of animals, crop production, genetics and soils, with all that these involve. He must know something of the agricultural sciences if he is to evaluate and interpret data about agriculture without making serious errors. Merely to be the son of a farmer is not sufficient.

Suppose the student cannot go beyond the four-year college course. Such a student may be preparing for farming, for agricultural business, for high-school teaching, or for county-agent work. What then should be included? If such a student is preparing for farming, I think his course should include from six to nine hours of farm management. This should include trips to representative types of farms, that are making good labor incomes, from which a year's financial records can be obtained so that a critical analysis of the business can be made. Other courses needed are elementary economics, co-operative marketing, and public relationships of agriculture.

If still less time is available, the first essential in this field for one who wishes to farm is farm management, because the first essential is to know how to make a profit from the farm. If the prospective farmer does not have time to learn how to operate a farm, run a co-operative as-

sociation, distribute the world's food supply and reorganize the government, he should begin with a study of crop and animal production and the business management of a farm and, at least temporarily, leave the reoganization of the social order to someone else. The briefer the course, the higher the percentage of the time that should be devoted to farm management.

A student who is preparing for farming and expecting to take a four-year course only, should, I believe, spend about 10 per cent of his time in the study of farm management and prices, and about the same amount of time in other business and economic courses. If this amount is to be reduced, most of the reduction should be in other work rather than in farm management.

If one accepts this point of view, it is not necessary to outline the basic course in agricultural economics, as there would be no such course. There would be courses in farm accounting and farm management, including trips to successful farms. The content of these courses has been outlined frequently in the programs of this Association. There would be a course in prices, or this course might be added to the farm-management work. There would be courses in public problems related to agriculture, co-operation, history of agriculture, and other courses previously listed.

If one is preparing for business, more work in prices, marketing, business management and accounting should be taken and less work in farm management.

For county-agent work, more work in marketing, co-operation, business management, accounting and sociology are required, but no less work in farm management. It is difficult for a county agent to get an adequate training in four years.

All courses of study are living and growing things. As more knowledge is obtained, the most desirable procedure will be decidedly changed.

The most essential points of my thesis are, that in preparing for research, for farming, or for commercial work, a very broad and extended training is needed; and that both agricultural science and practice are essential pre-requisites for specialization in the field of agricultural economics.

PREPARATORY COURSES FOR AGRICULTURAL ECONOMICS[1]

ALEXANDER E. CANCE

MASSACHUSETTS AGRICULTURAL COLLEGE

A great educational student and philosopher once defined education—"Education is not merely a preparation for life, it is life." Many years ago I was told—"Every question is an open question in New England." I am not sure that I fully understand the first, and I'm very certain the second has many exceptions,—nevertheless my discussion of the subject assigned me should be interpreted from the viewpoint of both of these statements.

I learned long ago that there is no one answer to any problem of college curricula. Who can say finally and positively just what this curriculum, this "little course," should include for every man everywhere until he is prepared to say what shall be the content of the longer course, life itself? First we must define our objectives. Even after we agree on objectives, and this is by no means likely, we must agree that we haven't a common starting point. Some of our students are intensely farm-minded, many are utterly city-minded with no rural concepts whatever, and others seem to have no mental images at all. Without going further, it is evident that the question is open.

To prepare students for life and leadership—rural life and rural leadership if you will,—to earn a living, to understand and appreciate the industry of agriculture and the significance of rural life and rural people are primary purposes of an agricultural college education.

To inspire and further to train these men to interpret and solve the economic problems confronting the farmer and the industry is the specific function of the economist. Very few students can hope to attain these objectives in four crowded college years. My own observation is that a satisfactory accomplishment is the attainment of a rational and sympathetic attitude, a true perspective, a scientific approach, a knowledge of the sources of information, and a real desire to solve the economic and social problems of ag-

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

riculture. In any event the problem is one of teaching men to think clearly and without prejudice, and to act confidently.

Therefore it seems to me that the preliminary subjects need differ little from those which educators prescribe in other vocational schools. It is vital, I think, that all instructors should visualize their subjects in terms of their contribution to human welfare, their possible services to society, especially as passed on through the mediums of their students. In the present day, the social and economic problems are tremendously important in every phase of life. The social point of view is essential in the wise development and application of every science and the practice of almost every art. The problem, as I see it, is the socialization of chemistry, physics and biology and the technical studies dealing with material production. Many courses are offered without adequate consideration of the service of the course to the student, without definition of objectives. Most of the subjects of the curriculum could be used in building a foundation for the study of society if they were taught functionally, having in mind their ultimate purpose in modern life. But unfortunately we have not enough teachers who have the social viewpoint.

Specifically my program would provide:

1. A general orientation course, required of all entering students and carried through the freshman year. This course should introduce the student to college, show him the purpose and value of a college training, acquaint him with the nature of the world and of man—of the story of man's mental and material progress to the present, the great problems of humankind, the fields of knowledge and the departments of scientific thought designed to answer man's problems. A course of this sort rightly taught helps the green student to appreciate the long, hard struggle of man to cope with his environment. It gives him a notion of the scientific method of looking at material and social problems. It acquaints him with the problems of agriculture and rural life and indicates the part which each department on the campus is designed to play in solving these problems.
2. Courses supplying the tools of learning.

English composition and public speaking. Of the methods by which personal knowledge may be made powerful to move others, the well-written word, the well-spoken word, and the impress of personality are probably most important. These courses may well be carried through the first two and a half or three years.

Mathematics. The branches used in ordinary business relations and needed in the analysis and interpretation of quantitative data are important.

Foreign language. One or more may be necessary for actual use in business or in research. In such cases it is fundamental as a tool and should be acquired as early as possible.

3. General basic courses.

At least two or three courses in physical and biological science for all students.

At least one course in history—preferably economic history.

At least one course in psychology.

4. Preliminary courses in social science.

a. An introductory course in economics, chiefly for orientation and definition. All clear thinking must be based on well-defined terms. Most students have had little or no acquaintance with economics before entering college, although they have had plenty of economic experiences. Any thinking they may have done has been loose and careless, and economic phraseology has been in vague terms. The words and phrases of the street must be translated into the technical jargon of the textbook and the class room. I would give a good deal of time to building economic concepts, defining terms and introducing the student to the economic phenomena within his experience and observation. Parenthetically, it is usually easier to make the introduction by way of human wants, their kinds, causes, and effects; that is, by consumption economics rather than by production. This gives the objectives of economic activity and the cause and direction of industry, whether it be agricultural or manufacturing.

b. The elements of sociology with some emphasis on its rural aspects. This, too, is a course which should make the

student aware of social phenomena, the complexity of modern life, the social significance of almost every important act. The aim is social-mindedness and sociological definition.

c. A survey of the agricultural industry especially in the United States. This course should, among other things, acquaint the student with the variety and magnitude of the agricultural industries, their geographic location, economic characteristics, the physical and social reasons for their location and character, their functions and importance in our modern economic life, their historic setting and economic future. The story of the development of agriculture and the discovery, conquest, and utilization of our physical resources is as fascinating as it is enlightening. The picture of American agriculture in its geographic and economic setting, in comparison with industries here and agricultures elsewhere, its tremendous and varied human population and its amazing annual output is as splendid and thought-provoking as anything he finds in college.

A course of this kind, it seems to me, should be required of every student of an agricultural college, no matter what his specific field. It should be beyond argument that every student should have a comprehensive view of the great field of study in which he has chosen to specialize if he is to be really educated therein. At any rate it gives a concrete factual basis for a later study of the economic principles deduced therefrom.

d. A course in citizenship or the elements of political science. The content of this course includes the growth, development, and purpose of political and educational institutions, local government, the powers and responsibilities of citizenship, the relation of the State to the individual and to social and economic institutions. In particular the relation of the public authority to education and public welfare should be considered.

The preceding four courses should be required of all students. They are fundamental for students majoring in social science.

e. Accompanying these courses, in the sophomore year, economics students should take work in agronomy, animal

husbandry, and, perhaps, another technical subject, such as horticulture, agricultural engineering, economic entomology, or dairy manufacturing.

f. Courses in (1) the principles of agricultural economics, (2) farm management and accounting, and (3) the elements of statistics, may well be paralleled with courses on (4) the industrial organization of society, and (5) the financial organization of society. The objectives of the course in agricultural economics are: (a) To outline the scope and content of the subject. To my mind this covers the economics of agriculture as an industry and as a mode of life. It concerns its relation to consumers' demands, to other industries, to the State and to society as a whole. It deals with economic relationships existing between the different branches of the industry both in their domestic and international aspects. It includes the subjects usually covered in "production economics" with specific reference to the peculiarities of agricultural production. It considers also the principles underlying the distribution of the agricultural income and the problems arising therefrom. (b) To formulate certain general principles deduced from the concrete facts presented in earlier courses plus current data. (c) To imbue the student with a genuine respect for agriculture as an economic industry, a means of livelihood, and a mode of life. This part of the course takes account of the farmer as a consumer, of rural standards of living and of the principles underlying the conservation and utilization of rural resources, both physical and human.

The course in farm management is really a course in private farm economics and deals with the management organization and accounting problems of the individual farmer. For students preparing for commercial vocations this may be less desirable than courses in business accounting.

The elements of economic statistics needs no argument, I think. Every student of economics must be able to analyze, interpret and present quantitative data clearly and truthfully. Probably the most satisfactory method of teaching this course is by means of a statistical laboratory and the use of the problem method, using current statistical

data. An elementary text for definition and as a basis for discussion is desirable.

The two-term courses in general economics are designed to give students the essential facts concerning money, banking, and credit, or the financial organization of society, as well as the economic principles and problems of labor and industry. The entire course in general economics should include at least a full year of work and may be handled in various ways.

In view of the importance of the social and economic aspects of present day agriculture it would be desirable that all students preparing for agricultural vocations elect these courses, and others to follow, such as marketing, transportation and co-operative organizations. Our college faculties are not yet able to see the wisdom of such a requirement, chiefly perhaps because we have few deans and few influential faculty members who are convinced of the importance of social science. The curriculum is already full. To introduce courses in economics means that courses in natural science must give way. The great body of natural scientists in agricultural colleges have had little training in social science; in fact many are not sure there are such sciences. The same is true of many professors of technical subjects of agricultural production. Consequently changes will come slowly and the courses outlined can be required only of that group of students who signify a desire to do major work in rural social science.

My conception of a college education leads me to urge my students to choose courses in the appreciation of literature, of art and of music; to take at least one course in philosophy, one in evolution, and one in the principles of law. This is the more urgent if the man is to be a dirt farmer. If agriculture is to prosper we must develop a leadership that appreciates high standards of rural living, that values the beautiful and the intellectual and knows that our rural civilization is to be measured by its ability to consume well rather than by its capacity to produce.

BASIC GROUPS IN AGRICULTURAL ECONOMICS[1]

C. L. HOLMES

IOWA STATE COLLEGE

The question of what should be included as in irreducible minimum of agricultural economics work for the agricultural college student raises at once the question of who and what is the student in our agricultural colleges today. What is he there for? For what range of vocations is he training himself? Is he in an agricultural course in order to learn to farm? It is gratifying to know that at least some of our students have this objective. Let us hope that a higher proportion may be with us for that purpose as time goes on. Is the agricultural student in college to become a professional man in teaching, research, extension, and other fields of activity connected more or less closely with agricultural education? Certainly many of them are with us for that purpose if we judge by the vocational destination of the students who have gone through our colleges in the last few years. Are many of them taking agricultural courses in order to equip themselves for business vocations in fields closely allied to agriculture such as co-operative marketing, real estate, and the like? Adequate statistics as to the employment of agricultural college graduates would probably show that there is a growing proportion seeking employment in this field. Doubtless all of these motives and many others are responsible for the present enrollment in agricultural colleges.

The fact that we have such a wide range of interests and prospective occupations on the part of our present agricultural student body makes the task of selecting the proper amount and kind of agricultural economics instruction an extremely difficult one. In the first place, it would seem, in view of the wide diversity of interests on the part of the student, any closely prescribed body of subject matter in agricultural economics to be taken by all, or practically all agricultural students, should consist of such material as will be of general enough interest and vital enough to warrant its inclusion in the curriculum of any student inter-

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

ested enough in agriculture to be enrolled in an agricultural course.

Granting that, for the attainment of the general educational objectives which bring our students to us, agricultural economics has something which practically all of them should make a part of their college training, I would suggest the following as a most desirable and essential group of courses. First, farm organization and management, three semester hours or four quarter hours. Second, elementary value and price analysis applied to agricultural commodities and resources, three semester hours of five quarter hours. Third, the general financial system with special reference to agriculture, three semester hours or four quarter hours. Fourth, economic geography of agriculture, three semester hours or five quarter hours. This group would cover approximately two years of the student's time at the rate of three hours per week.

The first unit of this group, namely, Farm Organization and Management, or the Elementary Economics of Agricultural Production, should, if it fulfills the general purpose of this group, be much broader and more inclusive than the typical course usually presented under the title of "Farm Management." It should enable the student to place the agricultural industry and the farmers in their proper relation to the other great industrial groups in economic society. It should demonstrate the farmer's responsibility and opportunity as a business proprietor and a controller of our agricultural resources. More than this, it should acquaint the student with the principles of private economy applied primarily to the vocation of business proprietor, but quite as truly and definitely to the individual problem of the maximum utilization of any private resources.

There is a growing realization of the importance of economy, or private economics, as distinguished from collective economics from the point of view of which most of our economics courses, both in the general field and even in agriculture, have been presented. This elementary course, then, should serve the double purpose of giving the general agricultural student a view of the important field of private economy or administration of resources, and at the same

time serve as a foundation for the student who is destined to specialize in the important field of Farm Organization and Management as it is developing under present day research, teaching, and practice.

The second course—elementary value and price analysis applied to agricultural commodities and resources—is, in reality, the essentials of the usual course in the elements of economics shorn of its appendages such as transportation problems, labor problems, banking, and all of the various topics which are usually combined with the central theme in order to confuse the mind of the university sophomore. It is, as the title indicates, restricted to the analysis of the forces and conditions which determine prices, not only of commodities which represent final products, but also of the factors involved in the production of these commodities, all in terms of the agricultural industry. Value has long been considered, and rightly so, the central theme in economic science. If only one course were to be required of all of our agricultural students, it is my opinion that it should be this course.

The question will arise, "May it not be the usual university course in the elements of economics?" It is the practice in a number of institutions where the agricultural college is connected with a university or college where such a course is given, to require it of agricultural students. My answer would be that it is entirely feasible to do this, but that I believe a better course may be developed for the special need of agricultural students along the lines already suggested, namely, the elimination of considerations other than those of value and price, and the setting of the presentation in terms of agricultural conditions and transactions so far as illustrative and analytic material is concerned. The typical course in the elements of economics is really a course in industrial economics. I believe that a study of recently published textbooks for use in these courses would reveal that, more and more, the illustrations and the point of view are derived from commerce and industry, and that agriculture, which represents some very essential differences as compared with industry, is more and more dropping out of consideration in these texts.

In justification of the inclusion of the third unit, that is, the general financial system with special reference to agriculture, I would say that the financial element in our economic environment is so universal and so vital that a course in this field should be a part of everybody's education. The subject matter of it may be that of the usual course in Money and Banking, the Financial Organization of Society, or whatever such a body of subject matter may happen to be named. Here again, however, there are strong arguments in favor of making it a somewhat specialized course for agricultural students in order that the significance of the financial system in its relation to agriculture may not be neglected. Such a course should not only furnish the student with a fairly clear understanding of financial institutions and the relation of private individuals and business units to those institutions and the financial system in general, but it should enable him to carry away a fairly adequate understanding of the various phases of the so-called rural credit problem.

In consideration of the fourth unit named in this basic group, I confess myself to be somewhat in doubt as to its inclusion. There are plenty of arguments in its favor. For instance, any student in agriculture should be interested enough in the general aspects of the field to familiarize himself with the nature of the industry in which he is to work and its place in national and world economy. He should also be acquainted with the underlying forces and conditions which have been and are important in shaping it. The important question turns on where this course should be put. Is the student who has had only the three courses outlined ready to assimilate the subject matter which should be included in a course of this sort? That depends evidently upon the degree of analysis which is to be resorted to in presenting the course. Economic geography has, as we all know, been considered very favorably from the point of view of an approach or introductory course for the whole field of agricultural economics. Personally, I do not believe this is the proper use for it. The opposite view is that it should be placed well along in the curriculum so that the student will approach

it only after having a considerable amount of experience in economic analysis. If it is to be placed as I have here suggested, a middle ground will have to be struck with reference to the subject matter to be included, and the type of analysis to be followed. The question really turns upon whether all of our students are to be given an opportunity to visualize agriculture in its larger aspects, or whether this work shall be reserved for the smaller number who really make agricultural economics one of their major lines of interest and study. Personally, I prefer to present a course of the latter sort. Some institutions have sought to solve the problem by including two courses, one an approach course, the other an advanced course sometimes called agricultural policies.

We now come to the consideration of the second phase of this problem, namely, what additional work should a more limited group of students, interested in agriculture from the vocational and entrepreneural point of view, but not necessarily desiring to make agricultural economics their major interest, be given in addition to the three or four basic units already discussed? These additional courses should, it would seem, be made to cover the more important phases of the so-called agricultural problem, that is, buying and selling in both its collective and individual aspects; land problems in their various phases of utilization, rent, tenure, and value; the history of agriculture as it functions in the giving of perspective so indispensable in the understanding of the economic problems of the industry; and finally the study of the human side of the agricultural industry in terms of the considerations usually presented under the caption of Rural Sociology.

For this purpose I wish to suggest another group of four subjects as follows: First, marketing and cooperation, to which should be devoted at least four semester hours or six quarter hours; second, land economics, to which probably an equivalent amount of time should be devoted; third, Economic History of agriculture covering probably three semester hours or its equivalent; and finally, Rural Sociology including, if possible, the presentation of the more fundamental principles of sociology as such, to cover, at the

least, four semester hours. Space does not permit a detailed discussion of the specific content of these courses. For the most part they should embody the general and fundamental principles involved in the several fields they are designed to cover, rather than to attempt to cover minute details of specific application.

Neither is there time for much debate as to the inclusion of additional courses which might be suggested as belonging to this particular group. Many people would wish to include here at least a limited amount of work in what we may call service material or tools of analysis such as accounting and statistics. How much, if any, of this sort of work should the more typical agricultural student, not majoring in the field of agricultural economics, be called upon to take? Certainly, everyone who expects to bear any part of the responsibility of organizing and managing businesses, whether in the field of agriculture or of other industry, should have an adequate equipment in accounting. Quite truly also, certain lines of administrative responsibility call for an understanding of modern statistical method as applied to economic data. It does not seem, however, all things considered, that this material should be included in the group just enumerated. They represent a rather distinct class of material and, in a sense, not so essential as the work already enumerated. Certainly many students not interested in specializing to a high degree in agricultural economics will wish to get a limited amount of this sort of work on the elective basis.

For these and other reasons, it seems wise to include these methods courses with a third body of material to be listed for those students who are really majoring in the field of agricultural economics. Here I include, besides the methods courses, advanced work in the applied fields of Marketing, Farm Organization and Management, and other fields of special interest such as Rural Credits and Prices. Here also I would list the additional necessary work in Economic Theory as well as a limited amount of supporting work from other fields of economic study such as Finance, Transportation, Business Organization, and Labor, a larger or smaller amount of which may well be

considered as a part of the subject matter to be taken as desirable supporting work in the special field of agricultural economics.

It is to be remembered that this work is designed to be taken in addition to the courses listed in the other two groups. It is to be largely elective in order that students may shape the content of their training to meet their prospective needs in view of their various vocational expectations.

In the field of marketing after the first basic courses in the previous group, students may well pursue special courses having to do with the specific marketing problems characteristic of the various commodities. For example, we are probably ready for special courses in Livestock Marketing, Grain Marketing, Dairy Products Marketing, and Produce Marketing as well as work on the internal organization and management of cooperative marketing agencies.

In the farm organization and management field, the elementary course listed in the first group may well be built upon in terms of concrete problem teaching in the organization and management of actual farm businesses. This, of course, would involve not less but more of general principles than were embodied in the elementary course, but it should be presented in terms of concrete situations which will enable the student as far as possible to think himself into the responsibilities and opportunities of the actual farm business man. In this connection, there should be a very close tie-up between Farm Organization and Management courses and accounting.

This brings us to the question of accounting work. How much training in this field is needed? What shall be the nature of it? The only answer that can be made is that the student should receive enough of it to make it an entirely useful and adequate tool in business analysis either from the point of view of the research worker or in the actual practice of business administration. As to the particular brand of accounting, it should be recognized that accounting principles as well as other principles are common to all fields. This does not preclude the teaching of

accounting in terms of some specific application and use. Thus, we may justify a limited amount of farm accounting, and of accounting in connection with market business practice quite as logically as merchandising accounting or factory or railroad accounting.

Similar questions must be raised with reference to Statistics. How much training in this can the student afford to take? Certainly for many students the usual elementary course in statistical method is essential. For at least a few, an additional course in advanced statistical method involving multiple correlation and similar methods is desirable.

There is the question also of additional work in economic theory. The second course in the first group already referred to is certainly inadequate as the sole opportunity for work in this field for the specializing student. Near the close of his college course he certainly should be given an opportunity to elect a limited amount of courses dealing with the economics of other industries, such as transportation, finance, and the general organization of business, in their relation to the agricultural industry.

I would suggest that the agricultural economics major should take approximately 15 semester hours from this third group including the methods work, the applied agricultural economics courses, and the supporting work.

Let us sum up to see where we have arrived in this rather rambling and yet venturesome presentation of work for the agricultural college student in the field of agricultural economics. First, I have recommended a minimum of work for the general student amounting to 12 semester hours. Second, I have recommended an additonal group of vocational subjects for a considerable group of students who are looking toward more or less definite connection with the agricultural industry in the way of administration responsibility or, at any rate, a vocational connection. I have indicated that the amount of this additional work should probably be in the neighborhood of 15 semester hours, and should consist of general and introductory courses in the field of marketing, land economics, history and sociology.

Third, I have suggested a rather broad additional group of studies, both vocational and fundamental in their nature, to be provided for those seeking special training in this field and from which selection shall be made on the elective basis as definite training toward a vocation into which major training in agricultural economics should lead. I would include in this prospective vocational field not only actual responsibility for farming operations and for the management of agricultural businesses such as marketing units and the like, but also teaching, research, and extension in this field. It is suggested that at least 15 hours of work be selected from this last general group.

Summing this up, we see that, according to this outline, the general agricultural student will be getting 12 semester hours; the second group, 27 semester hours; while the last group, the majors, would be getting 42 semester hours, or approximately one-third of their total college course.

It is a difficult matter to determine the proper relation between vocational and the so-called cultural subjects which a student ought to take who is getting his education in an institution which is primarily technical but in which the development has been more and more in the direction of the time honored objectives of a college course. With 42 semester hours in agricultural economics, the major student would have approximately 85 hours for other work. This would doubtless be divided between basic elementary science, technical agricultural work, and the more definitely cultural subjects such as English, History, and Philosophy.

As to making Farm Organization and Management the first course, I believe it is sound pedagogy to use as the approach or initial course that which will tie up most closely to the student's previous interest. On the assumption, not entirely warranted, perhaps, that most of our agricultural students have a farm background, this linking with farmers' interests is best obtained by introducing them to the field through the medium of farm organization and management. The student has been with his father in meeting these practical problems on the farm. If the course is properly presented, a most effective tie-up for the purpose of creating and maintaining interest may there be

made. Also, if the course is skillfully handled one can scarcely fail to create and maintain a forward looking interest in the problems of the subsequent courses, particularly those in value and price analysis. No farmer can fairly face present day problems of determining what to produce and how to produce it, without raising the question of what determines the price of his products. Skillful teaching should create that interest on the part of the student in this elementary course which will carry him through naturally to the consideration of price making forces, marketing problems, land tenure, and the whole range of subject matter of which our field is composed.

Much discussion has been had during the last few years as to the proper approach to economic study. Agricultural history, agricultural geography, and a general survey of industry have all had their advocates as the proper medium through which the student may be led into the rather difficult field of economic analysis. I believe that for none of these mediums is there such a sound basis in good pedagogy as there is for production economics.

QUALITY FACTORS INFLUENCING VEGETABLE PRICES[1]

FREDERICK V. WAUGH

MASSACHUSETTS DIVISION OF MARKETS

The title of this paper has a familiar sound. During the past few years statistical studies have been made of factors influencing the prices of wheat, oats, corn, potatoes, sweet potatoes, apples, hogs, lamb, and many other agricultural commodities. It is, therefore, no novelty for this association to include in its program a paper discussing factors influencing vegetable prices.

In many ways the study described in this paper is similar to those which have been described in many papers which have been presented at recent annual meetings of this association. It makes use of the same technique of statistical analysis. It isolates and measures certain factors which influence the prices of asparagus, tomatoes, and hothouse cucumbers on the Boston market. The important difference between this study and most of the satistical price studies to date is in the factors considered. This is, however, an important difference, and should perhaps receive some attention at this point.

Prices of agricultural products—and, in fact, of most commodities—vary in two distinct ways. First, they vary from day to day or from year to year. Second, at any particular time prices vary according to differences in the quality or the appearance of the individual lots sold. The first type of price variation is represented by changes from day to day or from season to season in market quotations or in average prices. The second type of price variation is represented by the returns which individual producers receive.

With a few exceptions the statistical studies to date have concerned themselves with the first type of price variation —that is, in the analysis of the causes of changes in price from day to day or from season to season. This study, on the other hand, eliminates the day to day changes in prices, and studies the causes of variation in prices received for

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

individual lots of a commodity at a given time. The factors considered are, for the most part, physical characteristics of the commodities themselves—size, shape, color, maturity, uniformity and similar factors. The study is, then, a statistical analysis of market demand in an attempt to discover the important quality factors which cause high or low prices.

The practical value of such a study, if successful, is evident. Agricultural economists have been interested for years in the possibility of a better adjustment of production to market demand. This adjustment involves both the quantity of production and the quality of the commodities produced. The farmer must adopt a production program which will not only result in a crop of the size most suited to market conditions, but he must produce varieties and types of each commodity which the market wants and for which it is willing to pay. His marketing methods, also, should be based on an understanding of the market demand for particular qualities. Especially, his grading and packing policies should be based on demand if they are to be successful. Such terms as "No. 1," "A Grade," or "Fancy" are meaningless unless they represent grades which reflect in their requirements those qualities which are important in the market.

In spite of the obvious value of such studies, there have been few attempts to measure accurately in terms of dollars and cents the value which consumers and dealers place on quality factors. Almost all the studies of market demand for quality have been made by "consumer-demand surveys." While the surveys have in many cases been useful, and have undoubtedly added to our present knowledge of market demand, they are subject to the following criticisms: (1) In most cases it is impossible to measure consumer preferences *quantitatively* by the survey method. It is possible to list the desirable and undesirable qualities, but it is usually not possible to discover the effect of these factors in dollars and cents—nor even to rank them in order of their importance. (2) The questions asked in the survey often suggest the answers which are obtained. (3) The type of a particular product which is demanded de-

pends not only upon quality, but also upon price. Many consumers prefer to buy products of medium or inferior quality at low prices. Therefore, the types reported as being most in demand are not always the types for which the consumer will pay the highest prices.

A few studies made during recent years have definitely attempted a quantitative measure of the effect of quality factors on prices. The most noteworthy of these are, perhaps, the studies of the influence of protein content in wheat to prices, and a recent study of egg quality and prices in Wilmington. These studies have both yielded interesting and useful results.

From the standpoint of the individual farmer, this type of study may prove to be fully as useful as the studies of factors causing the general level of prices to change from day to day or from season to season. If it can be demonstrated that there is a premium for certain qualities and types of products, and if that premium is more than large enough to pay the increased cost of growing a superior product, the individual can and will adapt his production and marketing policies to the market demand. In most cases he will be able to take advantage of the results of this type of study better than those of a study which explains the relation of prices to acreage or total production. The individual farmer can not control the size of the crop which will compete with his. He can control to some extent the quality of the commodities he produces.

This study was started two years ago. An investigator began at that time to get records of actual sales of a number of farm products in the Boston wholesale market. His records showed the prices obtained for each lot together with a description of its quality. As the study progressed it became evident that it was possible in many cases to keep a rather complete statistical record of certain measurable physical characteristics of each lot. When enough of these records had been taken for a particular commodity, they were analyzed by multiple correlation methods to find the influence of the various factors on prices. In order to eliminate differences in prices due to seasonal changes, the actual prices were first expressed as ratios to market quo-

tations. In the following summary the figures have been reconverted to terms of dollars and cents by multiplying by the average market quotation for the period studied.

Asparagus

Two hundred individual lots of asparagus were inspected in Boston from May 6 to July 2, 1927. There was a great deal of variation in the prices received. For example, on July 2, 1927, a certain commission house sold one lot of asparagus for $4.50 per bushel box and another lot for $12.00 per bushel box. This difference in prices was due to differences in quality. One lot was extra fancy. It was green from tips to butts. The stalks were large, straight, and of uniform size. The bunches were compact. The other lot was classed as "junk." It was white. The stalks were small, crooked, and uneven in size. The bunches were loose. The butts were jagged and uneven. It is possible in a general way to list the desirable and the undesirable qualities of asparagus from such a casual observation as this. But a statistical analysis of accurate records of prices and quality enables us to estimate the relation of some of these quality factors and actual prices. The following summary shows the important quality factors affecting asparagus prices.

Green color is by far the most important quality factor influencing asparagus prices in Boston. Boston wants green asparagus. An inch of green color was worth 38½ cents per dozen bunches in the Boston market in 1927. That is, asparagus which was green throughout a length of 6 inches from the tip sold for about 38½ cents more per dozen bunches than asparagus which had only 5 inches of green color. Asparagus which was cut with 9 inches of green sold at $3.70 per dozen bunches as compared with $1.39 for asparagus with only 3 inches of green color. The influence of this one factor explained 41 per cent of the variation in prices found in the 200 inspections.

The average size of the stalks is measured by the number of stalks in the bunches. The bunches were of the standard size:—averaging about one pound and two ounces. There are few stalks in a bunch of the larger size and the number

of stalks increases as the diameter gets smaller. The analysis shows that for each additional stalk in a bunch the price tended to decrease by about 4 cents per dozen bunches. Asparagus of average quality which was packed with 10 stalks to the bunch tended to sell for about $2.91 per dozen bunches as compared with $1.63 per dozen for asparagus packed with 40 stalks to the bunch. The size factor explained 15 per cent of the variation in prices.

A record was kept of the actual diameter of each stalk in the bunches when the samples were inspected. The variation in size was measured by the quartile co-efficient of dispersion. The analysis of these figures indicates that the premiums paid for uniformity in size was small. Bunches which contained stalks of uniform size of stalk sold for $2.64 per dozen, other quality factors being equal, while bunches for which the quartile co-efficient was 40 per cent sold at $2.33 per dozen. About 2 per cent of the variation in prices was explained by this factor. This factor was about one-seventh as important as size of stalk and one-twentieth as important as green color in its effect on prices. The three together explained 58 per cent of the price variation. The coefficient of multiple correlation between these three quality factors and prices received was 0.76.

The study indicates that a large premium is paid for green asparagus in the Boston market. This suggests the possibility of growing asparagus with more green color for the Boston market. Whether or not this would be profitable depends on the cost of producing green asparagus as compared with the cost of producing asparagus with only a small amount of green color. This study should be supplemented by cost of production studies in the different asparagus producing areas in order to see whether or not the premium is large enough to pay the increased cost in the form of reduced yield per acre and decreased size of stalks. Such a study has been undertaken this year by the Massachusetts Agricultural College. A preliminary summary of the records shows that in Middlesex County it is likely to be more profitable to grow 8 inches of green than to grow 4 inches of green, except possibly in the case of old beds.

This study, then, does not give all the information necessary to form a basis for a production program. It gives only the first step. It states the premium actually paid in the market for certain quality factors. When this is supplemented with production studies which show the methods of producing commodities of superior quality and the relative costs of producing different qualities, the combined studies may lead to definite recommendations as to varieties and types to be planted and production and packing methods to be adopted.

Tomatoes

Inspections of tomatoes were made throughout the season of 1926 and detailed records were kept describing each of 370 lots. Because these records were so complete, it was decided to include as many factors as possible in the multiple correlation analysis, and to attempt a detailed statement of the relation of prices to a number of different factors.

The first three factors: Day-of-the-week, Pack, and Place Grown are shown as residuals. That is, after allowing for differences in the other quality factors, the figures indicate the average difference in prices of tomatoes of average size, color, condition, etc., on the various days of the week, packed in three different ways, and grown in ten different towns.

Tomato prices on Monday, Tuesday, Wednesday, and Thursday were almost exactly the same. On Friday and Saturday prices were lower. There is a general tendency for prices of perishable products to be erratic on Saturday because the demand is limited. No storekeeper wants to keep tomatoes over Sunday.

Prices of Average Quality Tomatoes

Monday	$2.16	Thursday	$2.14
Tuesday	2.17	Friday	1.94
Wednesday	2.18	Saturday	1.83

Tomatoes of average size, color, condition, etc., sold for about $1.77 when packed in jumble pack; for $1.86 when packed "face and fill" and for $2.05 when packed

in layer pack. That is, there was a premium of 9 cents per bushel for a faced pack over the amount paid for jumble pack and a premium of 28 cents for layer-packed tomatoes. The size of this premium depends somewhat on the quality of the tomatoes. The producer who has tomatoes of average quality, however, probably will receive a premium of from 25 to 30 cents per bushel for putting up tomatoes in layer pack.

There was considerable difference in the prices received for tomatoes from different towns. The actual average price of tomatoes inspected from Winchester was almost exactly twice that of the tomatoes from Stow. A large part of this difference, however, was due to the quality factors considered in the study and after making allowances for the effect of these factors, it was found that tomatoes of similar quality sold for about the same prices regardless of their origin. Part of the variation which is left is probably accidental, as the samples from these towns were small. Part of it is probably due to variation in quality factors which were not considered in the study. We have been unable to measure statistically such quality factors as taste, which undoubtedly influence prices.

Condition was the most important quality factor which influenced prices in Boston. Firmness was demanded above all things. This one factor explained 30 per cent of the variation in prices of the 370 lots studied. This factor had a greater effect on prices than the combined effects of all the other factors. Each increase of 10 per cent of firm tomatoes added 7 cents per bushel to the price; each increase of 10 per cent of soft tomatoes decreased prices by 4 cents per bushel; and each increase of 10 per cent of very soft tomatoes decreased prices by 7 cents per bushel.

Size was found to relatively unimportant in its effect on prices, but there was a slight premium for tomatoes from three to five inches in diameter, while the poorest size was from two to three inches. The size factor was about one-tenth as important as condition in its effect on prices.

While variation in color did not explain much of the price variation, it is nevertheless an important influence in the market. Each additional 10 per cent of the surface

which was covered with a characteristic red color tended to add 7 cents to prices. The reason this factor appears to have little influence on prices is that the color of the tomatoes inspected did not vary a great deal. The demand is for a tomato which is all red.

A small premium was paid for tomatoes of uniform size, but, as size itself is not important in the Boston market, it is not surprising that the variation in size explained only 1 per cent of the variation in prices.

The most important defect in tomatoes is growth cracks, and tomatoes with this defect are severely penalized in the Boston market. This factor explained 10 per cent of the price variation and is second in importance only to condition.

The most important factors influencing tomato prices in Boston were found to be first, condition; second, growth cracks; third, pack; fourth, size, and fifth, color. The combined effect of the twelve independent factors explained 50 per cent of the variation in prices. The co-efficient of multiple correlation between these factors and prices was 0.70.

Separate studies were made for each day of the week in order to discover the day-to-day changes in demand for certain qualities of tomatoes. It was found that the premium paid for color is fairly uniform throughout the week. It is greatest on Thursdays. The premium on 3- to 4-inch size is erratic. It is small during the first of the week, large on Fridays, and is a minus quantity on Saturdays. That is, smaller sizes are preferred on Saturdays. The percentage of firm tomatoes is important every day, but the premium for firm tomatoes is especially large on Thursdays. Some of these differences in demand from day to day can be easily explained. Thursday is known as "shippers' day" in the Boston market. Outside buyers are in the market. They are very particular about firmness, as they must re-ship their purchases. They also are willing to pay a good premium for color. The influence of these outside buyers is shown by the fact that 73 per cent of the variation in prices on Thursday was explained by the one factor of firmness. The Saturday

demand is for firm tomatoes. Color is not so important as it is during the middle of the week. Small sizes sell readily. This is due, of course, to the demand for tomatoes which will keep over the week-end.

In the case of tomatoes, the most important factors affecting prices appear to be marketing factors rather than production factors. Size, color, and other qualities dependent on varieties and on production methods did not have so important an influence in the market. The important factors were found to be condition, growth cracks, and pack. Tomato growers who get the highest prices are on the ones who ship to market often and regularly in order to get their products to the market in firm condition; who grade carefully and remove all tomatoes affected by growth cracks; and who layer-pack their product.

Hot-House Cucumbers

Only two factors indicating quality in the case of hot-house cucumbers were measured statistically. These were length and diameter. These two factors were important, however, and explained a considerable part of the price variation.

The relation of cucumber prices to length was as follows:

Length (inches)	*Price per bushel*
6	$4.07
7	5.07
8	5.41
9	5.52
10	5.55

The market wants long cucumbers. Cucumbers less than eight inches in length sell only at considerably reduced prices. There is no considerable premium for length beyond eight inches.

The diameter of cucumbers should be rather small. The ideal diameter is between 20 per cent and 25 per cent of the length. More slender cucumbers sell at slightly lower prices and the heavy, chunky cucumbers sell at much lower prices. The relation of diameter to prices was found to be as follows:

Diameter (Percentage of length)	*Average Price Per Bushel*
15	$5.16
20	5.51
25	5.52
30	4.71
35	4.11
40	4.07

The study shows that the cucumbers which brought over $6.00 per bushel were over eight inches long, and the diameters were between 20 and 25 per cent of the length. The cucumbers which brought from $3.00 to $4.00 were less than seven inches long and the diameters were greater than 30 per cent of the length.

Forty-nine inspection records were taken for hot-house cucumbers. The multiple curvilinear correlation between prices and the two factors, length and diameter, was 0.76 and 59 per cent of the price variation is explained by these factors.

Long, slender cucumbers can be grown in any part of Massachusetts. Two things are necessary: proper varieties and good pollenization of the blossoms. A large section near Dighton, Massachusetts, still grows short varieties which are not subject to damage from certain insect pests. This is now unnecessary, as these pests can be controlled. Long varieties should be grown and a good hive of bees should be kept busy pollenizing the blossoms.

General Results of the Study

These preliminary studies of asparagus, tomatoes, and hot-house cucumbers have led to certain simple recommendations for production and packing methods adapted to the Boston market. They point out the possibility of growing a longer green color on asparagus. They show the importance of marketing tomatoes in such a way that the tomatoes will be firm, free from growth cracks, and packed attractively. They show the possibility, in some parts of Massachusetts, of growing a type of cucumber which more nearly fits the market demand.

The study has a bearing on a number of other marketing questions. Space will not allow an extended discussion of

them here, but two questions should be mentioned. This type of study gives a practical and much-needed check on official grades and on market reports.

Are official grades based on the factors which are most important in the market? It is interesting to note that U.S. grade No. 1 for asparagus does not require any green color, and the U.S. grades for cucumbers do not specify any particular length nor diameter. It is true that the length of green color on asparagus and length of cucumbers may be marked on the box in addition to the statement of grade, but if these factors are the most important ones, should not some minimum be required before the use of the name "No. 1" is allowed? Of course this criticism may or may not hold for other markets, but in Boston a real "No. 1" bunch of asparagus must be green, regardless of the legal grades.

Another interesting question with reference to grades is brought out by the fact that uniformity in size was found to be relatively unimportant in the case of both asparagus and tomatoes. No general conclusion should be made from these two studies, but studies should be made of other products in order to find out how much premium is actually paid for products graded strictly according to size, since uniformity in size is required in almost all grades.

The study shows that there is a great deal of variation around the quotations in the market report. In general it shows that the quotations have fairly reported the prices at which the bulk of the products sold. It also shows about what quality of farm products usually sell at near the quotation and the amount above and below the quotation received for superior quality and low quality. It calls forcible attention to the need for standard grades as a basis for market reports.

The relation between prices and quality factors for the three commodities studied was similar, as shown by the following figures:

Commodity	*Coefficient of Multiple Correlation*	*Coefficient of Determination*
Asparagus	0.76	0.58
Tomatoes	.70	.50
Cucumbers	.76	.59

As this table shows, it was not possible in any of these studies to explain all of the price variation by differences in the quality factors considered. This is due to two reasons: first, it is impossible to measure statistically many factors which influence prices; and second, many other factors beside quality may have some influence on the prices at which individual sales are made. For example, the bargaining power of buyers and sellers may be an important factor which cannot be considered in a study of this kind.

The fact that a perfect correlation is not obtained between prices and quality factors need not cause much concern. Perfect correlations in economic data are rare. It should be possible by analyzing quality factors in greater detail to explain more of the causes of high and low prices. But, while this study does not entirely explain the causes of variation in the prices of asparagus, tomatoes, and hothouse cucumbers, it does show the influence of some of the most important quality factors and measures this influence in terms of dollars and cents. Such data can be of a great deal of practical importance to American farmers.

THE EFFECT OF THE CORN BORER ON FARM ORGANIZATION IN THE CORN BELT[1]

C. R. ARNOLD

OHIO STATE UNIVERSITY

The corn borer has been known to be in the United States for the past ten years. Only during the last six years, however, has it been in evidence in the North Central States, where more than three-fourths of our corn is normally produced, and only in the last two years has it been spreading rapidly toward our intensive corn sections. First infestations of our important corn area appeared near Toledo, in northwestern Ohio and near the west end of Lake Erie. Evidence indicates that the infestations in this area came from Canada rather than from the previously infested New England territory. In this paper only the infested territory of the Corn Belt or areas adjacent to it will be considered.

The present infested territory is in the extreme northeastern corner of the Corn Belt. The territory over which the borers have been found covers an area about the equivalent of one of the larger Corn Belt States. Of this area about one-half is in Ohio, and the remainder in Michigan and Indiana. The eastern half of the infested part of Ohio and a major portion of that in Michigan, however, although raising some corn, are not ordinarily considered as a part of the Corn Belt proper. Only approximately 4 per cent of the corn of the North Central States is at present grown in known corn borer territory but under the past rate of spread it is not many years removed from the most intensive corn section of the country. A joint committee of agronomists, entomologists and agricultural engineers has stated that "in their opinion it will be impossible to eradicate the borer or even to prevent its spread to the corn-growing areas not yet infested."

A majority of the changes in farm organization and practice in the past have been the result of improved methods, increased marketing facilities, or increased demand. The development of a new machine, or of a new variety, or the

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

discovery that a certain product could be produced more economically in a new area has often forced old production territory into change practices or into a shift in the type of farming. These changes are the result of developments of greater efficiency and the old territory is suffering, not because of an increased cost of production but because the market can be supplied at a low cost by another area with which they find difficulty in competing.

The effects of the European corn borer or the cotton boll weevil are somewhat different. They have caused an increased cost of production in the territory infested and created no greater efficiences of production in any of the other producing areas. The effects on farm organization changes are somewhat the same in either case but the causes are different. The one is the result of increased competition from other areas or methods with lower costs, whereas the other is from the increased cost placed upon the farms in the area where the change will take place.

Any new insect pest or disease is usually accompanied by some adjustments in farming practices and often by a change in the type of farming. This is especially true when the entire production area is not infested at the same time. These changes may be due to the loss suffered through a reduction in yield or to the extra effort or cost necessary in combating the pest or disease. Up to the present time the actual commercial damage through a reduction in yield on account of injury by the corn borer to the growing crop in the United States has been almost negligible and limited to small areas near Lake Erie and Lake St. Clair. But the very great damage caused by this insect in the corn section of Ontario, which is really a continuation of the Corn Belt of the United States, and the danger to our great corn producing area has made the adoption of special practices to keep the corn borer infestation down very essential.

Essex County, Ontario, had 82,542 acres of corn for husking in 1923. Only 3 of the 88 counties in Ohio had as great an acreage. On account of the ravages of the corn borer that acreage has been reduced to 21,592 acres in 1927. Anyone visiting that area this year must admit that much of this limited acreage will produce very little grain. This

decrease of more than 60,000 acres, or three-fourths of the acreage in 4 years, was naturally accompanied by very radical changes in the type of farming and farming practices. An increase of about 25,000 acres of small grain (mostly wheat and barley), an increase of about 16,000 acres of alfalfa, a shift from 2,000 to 6,000 acres of sugar beets, a considerable increase in canning crop production, and a tremendous increase in the acreage of tobacco has been the result. Seventeen thousand acres of tobacco were produced in 1927 in Essex County alone—nearly as large an acreage as is now devoted to corn for grain. Climatic conditions and a favorable tariff have made tobacco a popular substitute for corn as an income-producer in that county.

This great change in Canada was the result of a reduced yield of corn through destruction of the crop by the European corn borer. As stated before, we do not have any such examples at present in the United States, and it is hoped that we never will. A knowledge of what has happened in Canada has made the adoption of control practices in the United States imperative. Present evidence indicates that the most practical means of control is through a destruction of all corn stalks and stubbles before the emergence of the moths in the spring.

The effect which the corn borer will have upon the type of farming in the Corn Belt is problematical. It will, first of all, depend upon whether the borer can be controlled, or whether we must turn away from corn and seek a substitute for this major crop of the North Central States as has been necessary in the corn belt of Canada. If the borer can be controlled so that the commercial damage will be negligible, then the changes in type of farming will depend upon whether the changed practices made necessary to keep it to this point of infestation will so increase the cost of production that some substitute crop will be more desirable.

During the past year the first real effort was made to fight the corn borer in the United States. Such drastic action was not taken when the borer first appeared in Canada and the increasing infestation there was not greatly hindered by enforced regulations, so we cannot look to the Canadians for information on this phase. During 1927 ap-

proximately 3,000,000 acres of corn land was in the infested area in the United States where the farmers were required to destroy all particles of corn stalks in an effort to combat the borer. Destruction could be accomplished by putting the corn into a silo, by shredding finely, by plowing refuse under completely, or by burning.

It is generally agreed that we will have the corn borer for some years in the future at least. It also seems evident that either the type of farming or the farming practices or both will necessarily be adjusted because of it. If unmolested it will probably reduce our yields, and so far as we know now, the control of the pest will mean considerable additional cost placed upon corn production.

In order to know the amount of extra effort which was required to combat the corn borer by the mechanical methods as used in the clean-up of 1927, and also to determine what changes, if any, farmers were making, or planning to make, in their farming practices and farm organization because of it, a rather intensive study was made in northern Ohio and southeastern Michigan during the past summer and fall. Figures were secured from more than 700 farms on the changes made necessary by the corn borer clean-up campaign.

First, let us assume that the methods of mechanical control employed during the past season in the infested area will keep the borer below the point of commercial damage. In this case the losses sustained from the borer will be the extra labor necessary to clean up all corn refuse according to certain specifications and the reduction in farm income resulting from delayed seeding, readjustment of the labor distribution program, and additional investments. The effect which the borer will have upon farm organization and practices will depend very largely upon the present type of farming and the practices commonly followed. The present infested territory includes sections with greatly different farming systems. For that reason the study mentioned included about 60 farms in each of 12 counties in different parts of the infested area. For convenience these have been grouped into type-of-farming areas somewhat typical of the different conditions in and near the Corn Belt.

The area in northeastern Ohio may be considered adjacent to but not necessarily a part of the Corn Belt proper. It has been subject to greatly increased industrial development during the past few years and is the whole milk producing section of Ohio. Farms in this area average from 80 to 90 acres, with slightly less than one-half the total acreage in field crops. Approximately one-third of the total crop area is in hay and the other two-thirds divided about equally between corn, oats, and wheat. Thus the acreage of corn will average 10 acres or even less per farm. More than 90 per cent of the corn is normally cut and approximately one-half of the farms have a silo.

A very large proportion of the corn land in this area is seeded to oats the following spring and the land is normally plowed in preparation for this crop. Combating the borer through destruction or plowing under of all the corn stalks and stubbles does not present a serious problem in this area because the requirements of the clean-up recommended to keep the borer population at a minimum are so little different from the normal practices. On the 189 farms surveyed in this area an average of 2½ hours extra labor was used per acre in 1927 in getting rid of the stalks and stubbles (see table 1). A major portion of this work was handpicking and burning the material which was not completely covered by the small two-horse plows which are common in this area. Also the 1926 corn crop had been harvested without a knowledge that a clean-up would be required, so little effort had been made to cut the stalks lower than usual. A smaller amount of labor was required in cleaning up stalks around buildings, feed lots, and pasture fields where long stalks had been fed. A considerable portion of this also may be eliminated in the future.

If this mechanical method of control is successful in keeping the insect population below the point of commercial damage the borer will not present a serious problem in this or similar sections. Even under conditions of last year, this small amount of extra effort per acre, and only 3 or 4 days extra labor per farm, do not seem sufficient to cause any radical change in the farming system. The extra labor per acre does not create an excessive cost, the small acreage

of corn, and therefore the small amount of extra labor per farm, will not seriously handicap the yields through delayed seeding, and little extra machinery or equipment will be required. Farming practices will be slightly modified but it is doubtful if the type of farming will be changed to any great extent because of the borer. This is a feed deficiency area and more desirable feed per acre can be produced by growing corn than any other crop now grown.

TABLE 1. LABOR AND POWER FOR PREPARING CORN LAND FOR SUBSEQUENT CROPS
(Corn stubble ground normally plowed)

Operation	Normal requirements		Corn borer conditions	
	Hours per acre		Hours per acre	
	Man	Horse	Man	Horse
Breaking stubble	—	—	0.5	1.0
Plowing	5.0	15.0	5.0	15.0
Disking (double)	2.0	6.0	2.0	6.0
Harrowing	.8	2.4	.8	2.4
Rolling	.8	1.6	.8	1.6
Handpicking	—	—	2.0	—
Total	8.6	25.0	11.1	26.0
Extra labor			2.5	1.0
Number of 8-hour days of extra labor on farms with 10 acres of corn			3	

In north central Ohio and southeastern Michigan, the acreage of corn per farm is considerably larger than in northeastern Ohio and east central Michigan, but still small as compared with the area farther west. The farms average around 100 acres in size and about three-fourths of the land is in crops. From one-fourth to one-third of the crop land is in corn, as both a three-year rotation (of corn, small grain, and grass) and a four-year rotation (of corn, oats, wheat, and grass) are common. This means an average of around 20 acres of corn per farm. The farming system here includes fewer dairy cows than the other area discussed, and more hogs and other livestock. A smaller proportion of the

corn is ordinarly cut in this area, so more stalk ground must be prepared for the following crops. The survey and census figures indicate that around one-half of the corn is husked from standing stalks. Less than one-fourth of the farms have silos and a considerably smaller proportion of the corn crop goes into silage. On the farms surveyed between one-third and one-half of the corn which was cut was shredded.

The corn land is practically all seeded to small grains, considerably less than half of it going to wheat in the fall and most of the remainder to oats the following spring. The wheat land is ordinarily disked twice before seeding but occasionally a field is seeded with only one disking ahead of the drill. This is practically all stubble ground with a very small portion normally seeded between the rows of standing corn. Most of the stalk ground and the remaining stubble ground is seeded to oats the following spring either with or without plowing. Ordinarily about two-thirds of all corn ground is seeded to subsequent crops without plowing.

Attempting to control the corn borer through a destruction of all corn stalks and stubbles in areas having this type of farm organization is a more serious problem. Two possible methods of meeting control practices seem feasible. First, the large portion of the corn land which was normally not plowed could be plowed; or, second, the land could be seeded in the normal way and the particles of stalks could be raked, picked up by hand and burned either before or after the seeding operations. Both methods were used in 1927 and both presented difficulties. (See table 2.)

Over a considerable portion of this area more labor is required to get the land into condition to seed after plowing in the spring than if it had not been plowed. Some hand-picking and burning was necessary last year even when the land was plowed. Figures from the 249 Ohio farms surveyed in this area indicated that an average of approximately 12 hours of man labor and 27 hours of horse labor or their equivalent in tractor power were required to prepare the seed bed for small grain on each acre that was plowed in an effort to get rid of the stalks and stubbles,

while less than 3 hours of man labor and less than 9 hours of horse labor would have been necessary under normal conditions. Thus four times as much man labor and three times the normal amount of horse labor were required on the land that was plowed as a means of destroying the stalks. Those who attempted to clean the fields by raking,

TABLE 2. LABOR AND POWER FOR PREPARING CORN LAND FOR SUBSEQUENT CROPS
(Cornstalk ground not normally plowed)

Operation	Normal requirements		Borer conditions, disked		Borer conditions, plowed	
	Hours per acre		Hours per acre		Hours per acre	
	Man	Horse	Man	Horse	Man	Horse
Breaking stalks	—	—	1.0	2.0	0.5	1.0
Raking stalks	—	—	1.4	2.8	.7	1.4
Hand picking and burning	—	—	4.0	—	—	—
Plowing	—	—	—	—	5.0	15.0
Disking (double)	2.0	6.0	2.0	6.0	2.0	6.0
Harrowing	.8	2.4	.8	2.4	.8	2.4
Rolling	—	—	—	—	.8	1.6
Hand picking	—	—	2.0	—	2.2	—
Total	2.8	8.4	11.2	13.2	12.0	27.4
Extra Labor			8.4	4.8	9.2	19.0
Number of 8-hour days of extra labor on farms with 30 acres of corn			31		34	

handpicking and burning, and seeding in the normal way without plowing, found the amount of man labor necessary was approximately the same as if they had plowed the land. Horse labor was somewhat reduced but over half of the man labor was the very undesirable work of picking up bits of stalks into a basket, carrying them to a pile and burning them. From 20 to 30 days of extra work during the busy spring season were required per farm under these conditions to fight the borer.

It must be remembered that these conditions were somewhat abnormal because at the time the corn was harvested in the fall the farmers had no knowledge that the clean-up would be required. However, that would only modify and by no means remove the problem.

Reduction in farm income through delayed farm operations is undoubtedly an important factor but one hard to measure. The number of days extra labor and the intervening bad weather greatly delayed the seeding of small grains in this section, which, in a normal year, would be reflected in reduced yields.

The cash grain area of northwestern Ohio and northeastern Indiana is more typical of midwestern Corn Belt conditions. The situation in Paulding County, Ohio, is typical of this area.

A typical farm of this section would consist of about 160 acres with 120 to 130 acres of crops. These crops would include from 50 to 60 acres of corn almost an equal acreage of oats and from 10 to 20 acres of hay. The rotation is corn and oats with a portion of the oats ground left for hay and the remainder put back to corn. Very little livestock is kept and the farm income is derived from the sale of corn and oats. Practically all the corn is husked from standing stalks. Only 2 per cent of the 2,700 acres on the farms studied was cut, none was shredded, and none went into the silo. Only one farmer visited reported hogging off any corn. Eighty-three per cent of the corn land was seeded to oats and 10 per cent went back into corn. Where oats follows corn the land is ordinarily disked in preparing the seed bed, or the grain may be drilled with no previous preparation, but never plowed. On account of the peculiar type of soil it is extremely difficult to get this corn land into condition early enough to seed oats if the land is plowed.

Since they have no silos, since very little of the corn is cut, and since plowing for oats is impractical, only one recommended method of destroying the stalks is available and that is to burn them. Extra labor in cleaning the corn fields on the farms surveyed in this area was not quite as great as on farms cleaned without plowing in north central Ohio partly because of more equipment and machinery and

also because many of these men normally raked and burned some of their stalks before the day of the corn borer. One-third of the men had special stalk rakes before the 1927 clean-up and another third of them purchased one during that year. The extra labor amounted to approximately 20 or 25 days per farm, and as a result considerable delay in seeding spring grains was reported.

With this picture of the extra cost which controlling the borer under these methods is placing upon the farmers in the different areas we realize that they must change their ordinary farming practices and operations. Whether or not they will change the type of farming depends upon whether the advantage which corn has enjoyed over other possible substitute crops is equal to this increased cost.

We must admit that under these conditions the cost of producing corn is increased by the corn borer and in most cases the farm income is reduced. The question is whether this reduction in income will be less if some other crop is substituted for all or part of the corn. Very few farmers in the different areas studied greatly reduced their corn acreage in 1927 because of the borer except those in Lucas County, Ohio, where a considerable infestation has been present for 3 or 4 years. Much of this was due to the extra labor in cleaning the fields and the fear of damage similar to the nearby territory in Canada rather than to actual commercial damage of their crops. However, this very slight shift over the area is not necessarily a true indication since the clean-up was so new over a large part of the territory and farmers had little opportunity to plan any changes in acreages. Another factor of considerable importance in some areas was the prospective reduction in yields of oats or other crops following corn on account of the changes in methods of preparing the corn land for the next crop.

The crops most commonly grown in a region are naturally those to which attention is first directed in looking for a possible substitute for corn. Oats, wheat, and mixed clover and timothy hay are the only crops which now occupy an acreage comparable with corn in the present infested area. If the borer infestation increases to the point of causing

serious commercial damage these crops will no doubt be at least temporarily substituted for a part of the corn acreage. Barley is often mentioned as a possible substitute feed crop. Figured at average yields and average prices for the northeastern Ohio area, corn has a gross value per acre of approximately $5.00 more than wheat, $8.00 more than oats, and $12.00 more than barley. This margin is considerably above the extra cost of the clean-up as conducted in 1927. As already stated the adoption of control practices in the northeastern Ohio area requires only minor modifications of present practices on most farms. If these practices prove to be effective in keeping the borer below the point of commercial damage farmers will no doubt find it more advantageous to follow these practices than to turn to other crops which produce less revenue and less feed per acre than corn. This is especially true on farms where the corn is put into the silo or shredded.

The farmers in other sections of the infested area which are more typical of the Corn Belt are more interested in a possible shift of a part of the corn acreage to some other crop. The larger acreage of corn per farm, the necessity for new operations involving additional labor and power for corn production, the fact that only a part of the corn stalks are now used for feed, and the difficulties encountered in some localities in plowing corn land in the spring for a small grain crop, combine to make the problem more important in these sections.

Sugar beets are grown to some extent in the northwestern Ohio and southeastern Michigan area and are a possible substitute on some farms, especially where corn is grown primarily for sale rather than as a feed crop. Alfalfa hay and barley are grown on some farms and may become more important as alternative crops. Tomatoes and other truck crops showed considerable increase in the area which showed noticeable decrease in corn acreage along the Lake and near the industrial centers.

The average yield of corn in the present infested area of northwestern Ohio, and southern Michigan is approximately 40 bushels per acre. Sugar beets and alfalfa hay are the only crops now commonly grown on general farms

which compare favorably with corn from the standpoint of gross value per acre. After deducting cash costs as taken from complete cost account data in this area, the returns from these three crops are similar. However, much land is adapted to corn which is not entirely suitable for the other two crops.

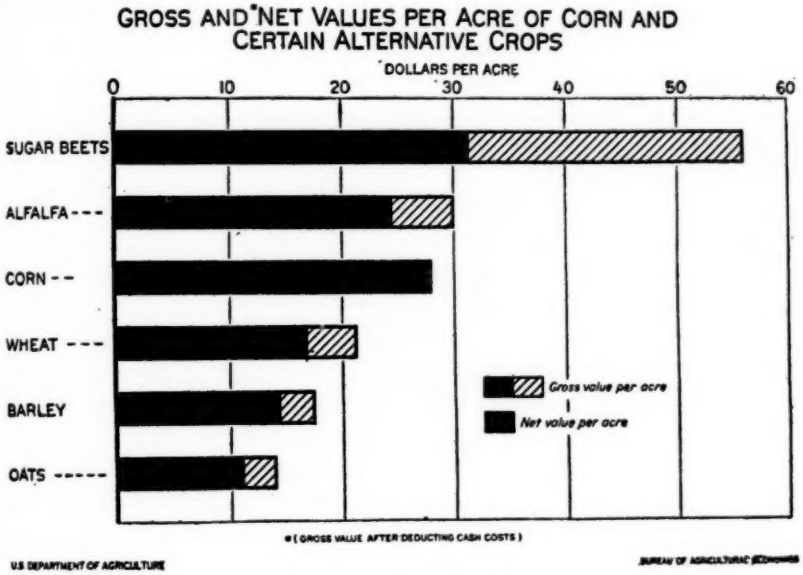
Information obtained from farmers in this area indicated a very slight tendency to shift a part of the corn acreage to sugar beets. Being a cultivated crop, sugar beets fit well into the usual crop rotation. Aside from the contract labor, the labor on sugar beets does not differ greatly from that used on corn either as to the amount or the time when the work must be done. Before substituting sugar beets, however, consideration must be given to the adaptability of the soil, the cost of hauling to the factory or shipping station, and the market outlets available. On farms where all of the corn is used for feed this change would necessitate the purchase of some feed or the reduction of the livestock enterprises. In addition the labor problems involved in sugar beet production are usually more serious than in the case of corn or small grain crops.

In considering alfalfa as an alternative crop for sale in the place of corn the type of acidity of the soil must be considered as well as the fact that a pronounced increase in the acreage of alfalfa grown for sale might necessitate shipment to more distant markets and possibly result in lower prices. Increased production of other possible substitutes would not have any marked effect upon their prices until a much larger territory is affected.

None of the small grains compare favorably with corn as a revenue producer. Oats and barley are the alternative crops usually mentioned as possible substitutes for corn as feed crops. Considering average yields in northwestern Ohio, Corn produces approximately 2,200 pounds of grain, barley about 1,200, and oats 1,100 pounds per acre. Although the feeding values of these grains are not the same, pound for pound, nevertheless the almost twice as many pounds of corn per acre indicates the superiority of corn as a feed crop in this area. The value per acre of corn above all cash costs in this area is approximately

$11.00 above that of wheat; $14.00 above barley; and $16.00 above oats. This again is more than the value of the extra labor required in cleaning the land but the new investments, delayed seeding, and other factors may reduce the income enough to offset the differences.

The disadvantage of the small grain crops is partly offset by the smaller amount of labor ordinarily used in small grain production as compared with corn. Corn ordinarily requires approximately twice as much labor per acre as the small grain crops. The labor on corn, however, is dis-



tributed fairly evenly throughout the year, while that on small grains is concentrated during the two very busy seasons of seeding and harvesting. Consequently more labor must ordinarily be hired for the work on small grains in this area than for the work on corn which can usually be done without additional expense for hired labor.

The small grain crops in this area are now grown largely in the rotation with corn. Any pronounced increase in the acreage of these crops in the place of corn would result in more plowing where two or more small grains are grown in succession. It would also increase the amount of

work during the already busy season of grain harvest thus probably increasing the cost of producing them.

Increased dairying with the accompanying increase in feeding of stalks and especially silage offers possibilities on some farms if the borers can be controlled by low cutting of the corn. This presents the problems of labor supply, equipment, and market outlet, as all could not do this, and it would be a sad day for the average Corn Belt farmer when he realized that he must begin milking cows for a living.

Shifts in production may have an effect on some other areas not directly affected by the borer as the increased production of tobacco in Canada caused by the borer is affecting the market outlet for the export tobacco producers of western Kentucky. If corn acreage is reduced on the marginal farm and some other crop substituted the effect on total production of these products may cause shifts in other sections.

In conclusion, the corn borer presents serious problems. High incomes from corn in western Ohio as compared with other crops has built up a structure of high land values. To maintain these values, or, what is the same thing, to maintain the incomes which have created these values, is of vital importance to the majority of farmers in this and adjoining areas. As the infestation and the problems which it carries spreads over the corn producing area, production and prices will be adjusted so that all corn producers will again be more nearly on an even basis. Until that time the farmers of the infested areas have the serious problem of a considerably increased cost with little probable increased price because of it. With no apparent universally suitable substitute crop they must either maintain their corn acreage with all possible efficiencies in combating the borer or readjust their individual farm organization to their own labor supply and market possibilities to maintain incomes if possible.

EFFECT OF LARGE-SCALE PRODUCTION ON COTTON GROWING IN TEXAS[1]

L. P. GABBARD

TEXAS AGRICULTURAL EXPERIMENT STATION

The recent developments in cotton production in certain areas of Texas are nothing less than revolutionary. While they are spectacular, nevertheless, they are fundamental and far-reaching in their economic significance, and even though new, they have already attracted both national and world-wide attention.

These new developments have been made both in the growing and in the harvesting of cotton, and thus far have been limited very largely to the coastal plains region about Corpus Christi and to the low and high plains regions of northwest Texas. Roughly speaking, they are applicable to the western three-fourths of the State. This region is characterized by smooth plains and prairies with increasing altitudes, ranging from an elevation approaching sea level in the coastal plains to 3,500 feet in the high plains area. The Corpus Christi area furnishes a good illustration of what is taking place. It is here that the introduction of tractor power, together with four-row outfits for planting and cultivating, enables one man to prepare the seedbed, plant, and cultivate 200 acres or more of cotton. Similar developments are being introduced in the high and low plains regions of the western and northwestern cotton belt of the State. Simultaneously, and particularly during the season of 1926, a large-scale method of harvesting known as "sledding" has been developed by which one man and a team of two horses can harvest from 4 to 5 acres of cotton a day. Along with this new method of harvesting, improvements in gin machinery for extracting burs and cleaning the lint have been developed and are being perfected.

These large-scale, low-cost methods are destined to improve the economic status of the cotton industry and particularly in those areas where such methods are applicable. Throughout its history, cotton has been characterized and

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

handicapped by an unusually high labor requirement. These new developments in a greater application of power and machinery should do much to remedy the situation. In short, they mean a more efficient utilization of both labor and equipment. They mean a greater volume of production per man and consequently a better chance of a larger net income. Thus the purchasing power, or economic status, of the individual farmer may be materially improved. A more efficient use of labor and equipment should have the direct effect of increasing the purchasing power of the area, and an indirect effect of facilitating the development of vast untilled areas, thus adding to the entire wealth of the community and the State.

Evidently this shift in cotton production from the areas of high costs to the areas of low costs will necessitate certain changes in the areas of high costs. In some cases the competition may be met by an improvement in the methods of cotton production, while in others the system of farming may be changed to the extent of emphasizing enterprises other than cotton. On the other hand, there may be those who will meet the competition by reducing their standard of living, while others may go into other businesses.

A number of factors have contributed to the recent interest in the development of these low-cost, large-scale methods in cotton production. The relative scarcity of farm labor, the increase in wages demanded by such labor as is available, the difficulty of securing and holding labor at the time and in the amount needed, the increase in land values, and the low prices for cotton such as prevailed in 1926, are factors which make more economical methods in cotton production imperative. On the other hand, the availability of large areas of level land which can be divided into large fields, and the marked improvements in farm implements and power machinery have made possible the use of large-scale methods not only in growing, but also in harvesting of the cotton crop.

The introduction of these new developments gives rise to a number of important questions. Among these are: the probable influence of these developments on the methods and costs of producing cotton, their influence on production

trends and prices, and their influence on shifts in production areas. This discussion will be devoted very largely to a consideration of different types of power and types of machinery in relation to their effect on labor requirements in cotton production.[2]

Trend of Cotton Production in New Areas

Before considering the influence of the different types of power and machinery on cotton-growing it might be well to get an idea of the trend of production in those areas where large-scale methods are more generally employed. In this connection northwest Texas may be mentioned as one of the important new areas in the cotton belt which has made a phenomenal increase in cotton production

TABLE 1. ACCOMPLISHMENTS OF ANIMAL AND TRACTOR POWER IN GROWING COTTON
Corpus Christi Area, 1926

Operation	Power		Size of Implement	Crew			Hours per Acre			Horse Equivalent of Tractor	Acres Covered in 10-Hour Day
	Horse	Tractor		M.	H.	T.	Man	Horse	Tractor		
Bedding	H.		1-row	1	4		1.80	7.20			5.5
Bedding		T.	2-row	1		1	.63		.63	11.40	15.9
Harrowing	H.		2-section	1	4		.46	1.84			21.7
Harrowing		T.	4-section	1		1	.23		.23	8.00	43.5
Planting	H.		2-row	1	4		.70	2.80			14.3
Planting		T.	2-row	[1] 1		1	.59		43	6.50	23.3
Planting		T.	4-row	[1] 2		1	.68		.28	10.00	35.7
Cultivating	H.		2-row	1	4		.65	2.60			15.4
Cultivating		T.	2-row	[1] 1		1	.45		.42	6.20	23.8
Cultivating		T.	4-row	[2] 2		1	.50		.23	11.30	43.5
Cultivating		T.	6-row	[1] 3		1	.58		.19	13.70	52.6

[1] Additional labor used on some farms.
[2] Number of men in crews varies from one to three, with an average of approximately two men to the crew. There is a strong tendency for the four-row one-man tractor outfit to become standard.

during the past few years. Texas Bulletin 364 points out that the production of cotton in the counties which lie wholly or partly in the high plains has increased from approximately 5,000 bales in 1912 to 430,000 bales in 1926. Such an increase is unprecedented, but is insignificant when contrasted with the possibilities of future expansion. Conservative estimates show that there are at least 20 million

[2] The author has drawn freely on data obtained cooperatively by the Texas Agricultural Experiment Station, the Bureau of Agricultural Economics, and the Bureau of Public Roads, U. S. Department of Agriculture. Results of the cooperative study have been published as Bulletin 362 of the Texas Agr. Exp. Station, "Large-Scale Cotton Production in Texas."

acres of tillable land in the western and northwestern cotton belt of Texas still available for cultivation. Space will not permit a discussion of the various reasons for this recent rapid expansion, but evidently large-scale operations have contributed no small part. The Corpus Christi area of south Texas, in the coastal plains centering about Nueces County, is mentioned as a second illustration of rapid increase in cotton production. The number of bales produced in this area during the past 27 years has increased from 6,000 to more than 250,000. It is in this area that large-scale methods have had their greatest development.

Labor and Power Requirements by Operations

At this juncture let us examine in some detail the labor and power requirements as shown by a study of 50 farms in the Corpus Christi area. Three groups of farmers were considered; namely, those using mechanical power alone, those using both animal and mechanical power, and those using animal power alone. The primary object in the discussion is to call attention to the relative efficiency of animal and tractor power for doing the principal crop operations when used with the same and different sized inplements.

Table 1 shows the usual power and implement combinations used in the most important field operations in cotton growing in the Corpus Christi area. It will be noted that all of the horse-drawn implements require a four-horse team. The tractor handles the same and larger sized implements. There is a much wider range in the size of tractor-drawn implements. For example, in the case of cultivating, all horse operations are performed with two-row implements, while with the tractor, two-, four-, and six-row implements are used. The tractors used on the cotton farms studied were 8-16 or 10-20 horse power in size.

By way of comparison one will note that a crew of one man and four horses bedded on an average of 5.5 acres per day, while a crew of one man and one tractor bedded on an average of 15.9 acres per day. In cultivating, a two-row horse outfit covered on an average of 15.4 acres, while a two-row tractor outfit covered 23.8 acres. Four-

and six-row tractor-drawn outfits cultivated on an average of 43.5 and 52.6 acres respectively.

The most interesting and significant fact shown in this table is the horse equivalent of the tractor for the several operations with the different sized implements. The number of horses required to do the same amount of work as one tractor in an equal period of time ranged from 6.2 in cultivating with a two-row cultivator to 13.7 in cultivat-

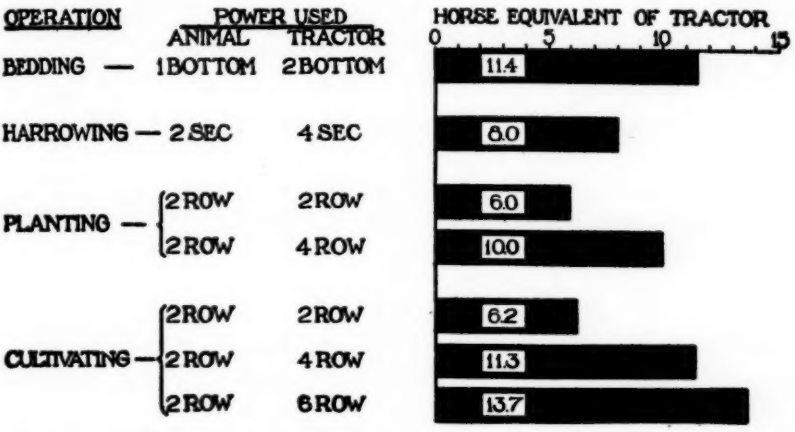


FIG. 1. THE HORSE EQUIVALENT OF THE TRACTOR FOR THE IMPORTANT MACHINE OPERATIONS IN COTTON GROWING FOR CORPUS CHRISTI AREA

ing with a six-row outfit. This fact is further emphasized in Figure 1 where the horse equivalent for each operation is shown. It will be observed from this chart that the tractor is relatively most efficient in those operations which require the greatest amount of power, such as bedding, planting, and cultivating.

Utilization and Cost of Animal and Tractor Power

One of the most important items of cost in the production of cotton is that of power, and the cost of power per unit is influenced very materially by the extent to which it is utilized.

The power for growing cotton in Texas is furnished by horses and tractors. At present a relatively small part of this power is furnished by tractors. The use of tractors,

however, is gaining headway rapidly in the level blackland area about Corpus Christi and in the sub-humid cotton belt of both the low and high plains of western and northwestern Texas. In fact, a number of cotton farms in these regions have been completely tractorized within the last few years.

The data compiled from survey records indicate no appreciable difference either in utilization or cost of tractor power whether used alone or in connection with mules. The average number of hours used was 800 with a cost of about 77 cents per hour. There is a wide difference, however, in the utilization of animal power between the group of farms where animal power alone, and the group where both animal and tractor power were used. For example, the farms where mules alone were used showed an average use of 739 hours each, while on those farms where both mules and tractors were used the mules worked an average of only 436 hours each. The cost per hour for the two groups were 18 and 25 cents respectively.

It should not be implied from this that horses cannot be used efficiently in combination with tractor power. In fact, there are certain operations on the farm; namely, hauling to gin, raking and piling stalks, rolling after planting, etc., for which horses seem better fitted than the tractor. Evidently the farms which had recently purchased tractors had not been able to sell their surplus mules or had deliberately chosen to keep them until the tractor had been thoroughly tried out.

Requirements of 200-Acre Farm

By way of emphasizing the outstanding facts both as to accomplishments and costs which have been presented, and with the hope of making their application more concrete, requirements for a 200-acre cotton farm, one operated by animal power, and the other operated by tractor power, are given.

It will be assumed in both cases that all of the land is in cultivation. Eight horses will be considered as sufficient to take care of the power requirements of the horse-operated farm. This is a maximum utilization of animal power when checked against actual practices for the area. Or-

dinarily 9 to 12 horses are kept where 200 acres are in crops. In the case of the tractor-operated farm, one tractor is considered sufficient power to handle the 200 acres. It should be stated, however, that the majority of farms using tractors also kept mules. Four-row planters and cultivators will be used. While four-row implements for planting and cultivating are not the most common, at the present time there seems to be a strong tendency for them to become standard. This is particularly true in the Corpus Christi area.

TABLE 2. LABOR AND POWER REQUIREMENTS BY OPERATIONS FOR A 200-ACRE COTTON FARM
Corpus Christi Area
Animal Power is to be Used for the Operations Given

Operation	Size of Implement	Times Over	Acres Over	Crew [1]		Acres per Day	Days Required 10 Hours	
				Man	Horse		Man	Horse
Stalk Cutting	1-row	1	200	1	4	6	33.3	133.2
Bedding	1-bottom	1	200	1	4	6	33.3	133.2
Harrowing	2-section	1	200	1	4	22	9.0	36.0
Planting	2-row	1	200	1	4	15	13.3	53.2
Harrowing	2-section	1	200	1	4	22	9.0	36.0
Cultivating	2-row	5	1000	1	4	16	62.5	250.0
Poisoning	6-row	3	600	1	2	70	8.6	17.2
Total			2660				169.0	658.8

[1] It is assumed that two crews of one man and four horses each will be used regularly, with the exception of such operations as raking and poisoning.

Table 2 gives in detail the labor and power requirements for the horse-operated farm. Stalk cutting, bedding, and cultivating are the operations requiring a relatively large amount of power. For the operations considered, the total number of days required for one man is 169, and for one horse 658.8. This would mean about 85 days for each of two crews of one man and four horses.

Table 3 gives in detail the labor and power requirements for the tractor-operated farm. The outstanding feature of this table is the small number of days required for both man and tractor. The number of days for man is 73.2 and for tractor 67.6. More than twice as many man days are required when horse power is used as when tractor power is used, and almost ten horse days to one tractor day are required.

A comparison of the cost of the labor and power re-

TABLE 3. LABOR AND POWER REQUIREMENTS BY OPERATIONS FOR A 200-ACRE COTTON FARM

Corpus Christi Area

Tractor Power is to be Used for the Operations Given

Operation	Size of Implement	Times Over	Acres Over	Crew		Horse Equivalent for T.	Acres per Day	Days Required 10 Hours	
				Man	Tractor			Man	Tractor
Stalk Cutting	7 ft. Tandem	1	200	1	1	13.3	20	10.0	10.0
Bedding	2-bottom	1	200	1	1	10.6	16	12.5	12.5
Harrowing	4-section	1	200	1	1	8.2	45	4.4	4.4
Planting	4-row	1	200	2	1	9.6	36	11.2	5.6
Harrowing	4-section	1	200	1	1	8.2	45	4.4	4.4
Cultivating	4-row	5	1000	1	1	11.3	45	22.2	22.2
Poisoning	6-row	3	600	1	1	2.0	70	8.6	8.6
Total			2540			9.3		73.2	67.6

quirements for these two farms should help to make the contrast more clear. An arbitrary figure of $2.00 per day for man labor and calculated rates of 18 cents per hour for horse work, and 77 cents an hour for tractor work will be used. These rates give a total cost of $1,524 for labor and power on the horse-operated farm and a total cost of $668 on the tractor farm for labor and power required. This indicates a saving of $856 on the tractor farm over that of the horse farm. These figures are for the machine operations only in growing the crop. It is assumed that chopping, hoeing, picking, hauling to gin, etc., would be about the same for both farms.

Mechanical Harvesting of Cotton

A discussion of large-scale cotton production in Texas, even though brief, would be incomplete without some recognition of the recent developments which have been and are being made in the harvesting of the crop. In fact, the introduction of more extensive methods in the growing of cotton have greatly intensified the need for a quicker and cheaper method of harvesting.

During the season of 1926 a mechanical method known as "sledding" was commonly used throughout the cotton area of the high plains and over much of the low plains. The cotton "sled" or "stripper" was used as early as 1914 and to a small extent several years later, particularly during 1918, 1920, and 1921. A relatively high labor rate for hand picking and snapping, weather conditions unfavor-

able to harvesting, and low and declining prices for cotton, may be assigned as immediate causes for the development of this new method. During the season of 1927 labor has been more plentiful, the weather more favorable to hand picking, and prices for cotton two to three times as high as during the season of 1926, consequently very little sledding has been done.

No standardized equipment has been perfected for sledding or stripping cotton, but considerable progress in this direction has been made during the present year. The greater number of the machines used during 1926 were constructed by the cotton growers themselves or by local blacksmiths. At the present time, however, a number of new machines are on the market. At least two large farm implement manufacturers have put strippers on the market. Cost figures secured on 26 sleds in the Lubbock area showed a range from $9.75 to $27 with an average cost per sled of $18.61. Some of the newer types of sleds cost around $200.

As might be expected, these sleds vary greatly in design, but might be grouped roughly under two types: namely, the *finger* and the *slot* type. In both cases the sled is a wooden or sheet-iron box on runners or wheels—generally wheels. The slot type of sled was more commonly used at first during 1926, but as the season advanced and growers became more experienced the finger type became more commonly used.

The most common crew used in sledding cotton is one man and two horses, with sometimes an extra helper. Such a crew can harvest around 4 and 5 acres per day, which with normal yields will produce about 2 bales of cotton. Allowing $3 a day for labor and $2 for the team gives a cost of approximately $2.50 a bale. The amount harvested will vary from year to year, depending upon the yield per acre, and the cost of harvesting will vary as labor rates and yields vary.

Cotton growers are by no means agreed as to the possibilities of this new method of harvesting. Some are of the opinion that sledding should be practiced more extensively since it reduces the cost of harvesting and in most cases

enables the grower to harvest his own crop. Others think that sledding should be practiced as a last resort only. Be this as it may, the chances are very good that, so long as labor for picking is relatively scarce and dear and cotton prices are low, the cotton grower will continue to be vitally interested in reducing his costs of harvesting to a minimum. Improvements in ginning machinery, and improvements and standardization of harvesting machines should do much to establish this new method. It should be stated in this connection that the recent improvements in gin machinery for cleaning the cotton lint and extracting burrs from snapped than in picked cotton of the same grade. The certainly very encouraging to mechanical methods of harvesting. A better understanding on the part of cotton merchants and spinners of the spinning utility of snapped and sledded cotton should help to remove the heavy penalty which is being placed at present on cotton harvested by these methods.

Spinning tests which have been and are being made on cotton harvested by different methods should do much to clarify the matter. For example, spinning tests[2] made in 1925 of Texas and Oklahoma picked and snapped cotton showed that the spinning qualities of the cotton were not noticeably affected by the method of harvesting nor was the percentage of visible waste materially greater in snapped than in picked cotton o fthe same grade. The commercial grade of the snapped samples, however, was about two grades below the picked samples. This raises the question as to whether the arbitrary commercial grades, as used at present, give a proper basis for price differences.

During the seasons of 1926 and 1927 a limited number of machine pickers were tried out experimentally with encouraging results. At yet none have been perfected. The perfection of such a machine and the sale of it at a price that would permit its general distribution would greatly facilitate large-scale methods of growing cotton.

In conclusion it may be predicted with much safety that these new developments will result in, (1) a further shift-

[2] "Spinning Tests of Picked and Snapped Cotton (Texas and Oklahoma—1925 Crop)," by Horace H. Willis, Associate Marketing Economist, Bureau of Agricultural Economics.

ing of the center of cotton production westward, (2) a steady settlement of new farm lands, (3) a probable increase in land values, (4) a tendency toward specialization, (5) reduced cost of production, (6) an increase in the size of farms, and (7) an increase in the amount of land that can be handled by the individual farm operator—hence an increased production and net income per man.

Discussion By J. D. Pope

Alabama Agricultural Experiment Station

Professor Gabbard's paper has raised the interesting question of the probable future effects of large-scale methods of cotton growing on the economics of the production of the American crop as a whole.

Of course large-scale methods will in any case have important effects on those who use such methods, but the question suggested is one of competition between two groups of producers, one group using methods making for a much lower cost of production than the other group. Will the more efficient group force the inefficient group to adopt improved methods or go out of business? Not unless the more efficient group causes a decline to take place in the price of cotton relative to other prices.

Large-scale production can cause the price of cotton to decline only under the following conditions:

1. If and when large-scale production increases to the point of being responsible for a large proportion of the crop.
2. If the large-scale producers are willing to bring into production a larger quantity of cotton at low prices than the small-scale producers.
3. If, after large-scale methods have become general, the increase in the volume of large-scale production takes place more rapidly than the secular increase in the demand for cotton.

The Present Status of Large-Scale Production

It is probably impossible to determine accurately the quantity of cotton that is produced under large-scale methods, as the term is used in this discussion. Certainly all the producers in the areas in which such methods seems to be most common cannot be classed as large-scale producers.

But even if the entire growth in the large-scale areas were produced by large-scale methods, it cannot be said that all of this additional cotton was a net increment due entirely to the large-scale methods themselves. We should have to know how much more cotton was produced with large-scale methods than would have been produced if such methods had not been available. Certainly a good deal of cotton would have been produced in the areas referred to if no large-scale machinery had been available.

If as much as 10 per cent of the American crop may be attributed to large-scale production alone, that 10 per cent would not appreciably affect the cost of production to the bulk of the growers. The practices of the 90

per cent of small producers would have indefinitely more influence on the economics of producing the crop than the practices of the 10 per cent of large producers. We may say therefore that large-scale production has not up to the present time had any important economic effects on cotton production except where practiced.

Western Competition

The acreage planted to cotton has increased very rapidly in west Texas during the past 50 years. Much new land has been put into cultivation and a substantial portion of this has been planted to cotton. A study of the acreage trend in this region indicates that the rate of increase is slowing up. There was almost no increase in the 10-year period 1909 to 1919. The acreage practically doubled, however, from 1919 to 1924. In 1924 there was a large movement into the plains of west Texas due probably largely to the fact that cotton was selling at unusually high prices. But undoubtedly with lower cotton prices and higher prices for land this movement to west Texas has slowed up materially. Apparently something else besides low costs of production with large machine units is needed to stimulate expansion of the cotton acreage.

Unless large-scale producers are willing to bring into production a larger quantity of cotton at a low price than the small-scale producers, they cannot be said to be offering drastic competition to the latter. Competition centers around the question of price. If large-scale producers can produce cotton say at a cost of 10 cents per pound, and make a living wage of selling it at 12 cents, will they do it?

During the past year the acreage planted to cotton west of the Mississippi River has decreased somewhat more than the acreage east of the River. In Oklahoma, which for several years took second place among the States in cotton production, the decrease in acreage to cotton in 1927 was 20 per cent. In southwest Oklahoma, the acreage to wheat has increased during the past three years while the acreage to cotton has declined. During the past year the acreage to cotton in Texas was reduced 11 per cent, while the acreage to wheat was increased 25 per cent. The weather may have been a factor in these changes, but cannot wholly explain them.

In 1926, when the record breaking crop of approximately 18,000,000 bales was produced, the surplus production was brought about to a greater extent by the increase in acreage which occurred that year in Alabama, Georgia and Mississippi than by the increase in the large-scale areas. In other words, in 1926 the small-scale producers apparently were troubled much more by the competition among themselves than by the competition from the big producers. In fact instead of being overwhelmed by a large-scale competition, the small-scale growers who have fewer alternatives when lower prices come and who have a lower standard of living apparently are offering competition to the large-scale producers and seem to be able to hang on longer than anybody else. The differences in standards of living of cotton producers east and west of the River should be recognized.

Demand Factors

If large-scale production *per se* can influence small-scale growers only through price, the possible effects may be neutralized by other factors tending to keep the price at a normal purchasing power.

The price of cotton is a resultant of both supply and demand factors. There is a secular increase in the consumption of cotton due to expanding uses for the staple and rising standards of living. The world needs a constantly increasing quantity of cotton. If the secular increase in production is just enough to take care of this growth in the world demand for cotton, then, assuming that other factors are unchanged, the relative price of cotton will be unaffected. If demand outruns production then the price will tend to increase. If production outruns demand then the price will tend to decline. If large-scale cotton production is to affect small-scale production it must be shown that the large-scale producers will increase the annual supply of cotton more rapidly than the growth of demand for cotton.

The world consumption of American cotton has increased during the past 25 years at the rate of about 3 per cent per year. This increase now amounts to an average of over a third of a million bales of cotton each year and at usual yields requires an annual increase of cotton acreage of around a million acres. If large-scale methods should cause a million acres of new land to come into production each year, that increase would only take care of the secular growth in cotton consumption.

Possible Future Effects

While large-scale methods as such do not seem to have had up to the present time any important effect on the economics of cotton production, except where practiced, the question arises, what effect will such methods, if they become common, have in the future? This question involves a long-term forecast of the future, which always contains unknown elements.

If large-scale methods in cotton production should spread to the point of being important in cotton production and should cause a permanently lower level of cotton prices, we would expect the small-scale high-cost producers to produce cotton more efficiently, or turn to other crops, take a lower standard of living or leave the farm. The effort toward lower costs of production would probably be directed along two main lines: 1. Increase in the yields of cotton per acre. 2. Increase in the acreage of cotton per man.

It is probable that the yield of cotton per acre in the Southeastern States can be increased economically from 50 to 100 per cent through the application of commercial fertilizers.

It is probable that a substantial increase in the acreage per man in the East can be made without any radical change in the machinery now used in cotton production. Studies in Alabama and Mississippi have shown in the same communities in the same season surprisingly wide variations in the number of hours used in growing an acre of cotton. Some of the most efficient producers in terms of hours per acre have used one-horse implements. It is probable that a great deal of the hoe work and other laborious work on cotton

can be eliminated without the purchase of expensive machinery. It is probable that many of the rougher lands in the Southeast would be abandoned for cotton production. It seems probable that the eastern cotton grower can increase materially his output of cotton without using much machinery larger than the one-row type. The eastern grower is being forced into this improvement now, not because of large-scale methods but because of the competition of industry for farm labor.

Conclusion

The only economic effects which large-scale methods of cotton production are exercising at present are on the few who use such methods. If such methods should in the future be used to an important extent they will affect small-scale growers only if they lower the price of cotton. Such methods *per se* cannot lower the price of cotton unless over a long period they cause the supply of cotton to increase more rapidly than the demand. The existence in parts of the Southwest of enterprises alternative with cotton and the steady growth in world consumption of cotton may prevent large-scale methods from making cheaper cotton. The small southeastern cotton growers are improving their efficiency and can do so still further in non-spectacular ways.

THE EFFECT OF IMPROVED MACHINERY AND PRODUCTION METHODS ON THE ORGANIZATION OF FARMS IN THE HARD WINTER WHEAT BELT[1]

W. E. GRIMES

KANSAS STATE AGRICULTURAL COLLEGE

During recent years numerous improvements in farm machinery and in production methods have been made and are now in common use on farms in the hard winter wheat belt. These improvements are tending to change the organization of farms in this region. While many of them are now in use on most of the farms it is doubtful if the full effects of their adoption are yet in evidence. The reasons for this are obviously to be found in the time required for farmers to make adjustments in their business operations.

This discussion of the effect of improved machinery and production methods on the organization of farms in the hard winter wheat belt is based upon data available from secondary sources and from researches in various fields that have a bearing on the problem. No specific field study has been made. However, it is believed that the data are adequate to permit a statement of the immediate and of the probable ultimate effects of these improvements on the organization of farms within the region.

Improved machinery that has come into general use in the hard winter wheat belt includes the tractor and power machinery to be used with it, and the combined harvester-thresher. Improved production methods and practices now in general use include more timely and better preparation of the seedbed for wheat, better adapted varieties of wheat, the sorghums and corn, and more effective use of control measures for plant diseases and insect pests.

The improved production methods and practices reduce the hazard in growing crops, and are resulting in increased yields of higher quality products. The use of these methods is fairly general over the region although there are localities where they are little used and there are farms in all

[1] This paper was read at the eighteenth annual meeting of the American Farm Economic Association at Washington, D.C., December, 1927.

localities that are still using the older, less desirable methods and practices.

Power machinery has been steadily increasing in importance in the area since prior to 1915. In 1915 a typical portion of the hard winter wheat belt had 2,493 tractors. In 1926 this same region had 33,852 tractors and the number is still increasing. Another significant change that is occurring is in the size of the tractors used. For a time the tractor that would pull a two or three bottom plow was most commonly used. During the last two or three years tractors of greater size have been more commonly purchased. These larger tractors are pulling three or more plow bottoms, three- or four-row or even larger listers, disk plows of a width of five or more feet, and other machinery of comparable size.

The combined harvester-thresher made its appearance in the hard winter wheat belt about 1917. It has been widely adopted and in 1927, according to estimates, more than one-half of the wheat of the hard winter wheat belt was harvested with the combine.

Most of the combines sold in this region in 1917 were 9 feet in width. In 1918 they were widened to 12 feet by adding a 3-foot extension. By 1920 the usual machine sold had a 12-foot cutter bar and this was later extended to 15 feet and then to 16 feet by the use of extensions. The machines of 15 and 16 feet in width then became the more common ones sold and in recent years many wider machines have been purchased and 20-, 24-, and even 36- and 48-foot machines are to be found in use. On the other hand there are still many smaller machines sold each year.

The trend toward the larger combine has undoubtedly been one of the major forces encouraging the use of the larger tractors. The larger tractors were needed to pull the larger combines.

Some of the effects of the adoption of improved production methods and practices and of larger and improved machinery in the hard winter wheat belt have been (1) reduction of the hazard in the production of crops, particularly wheat; (2) an increased opportunity to secure high yields of better quality grain; (3) an opportunity for

one farmer to farm larger areas equally as well as, if not better than, under earlier conditions; (4) reduced bushel costs for wheat because of (a) higher yields per acre and (b) reduced costs per acre for seedbed preparation, seeding, and harvesting; (5) material replacement of labor with capital in farm production; (6) reduction of the farm population in the older, more fully developed portions of the region since fewer farmers are needed; (7) less credit is needed and used during the harvest season since wheat can be sold the day harvesting is started with the combine; and (8) the services required of the rural merchants and of others rendering similar services in rural communities have been changed and reduced with the reduction in the number of transient harvest laborers and the reduction in the farm population. Some of these results are not fully in effect as yet but the process of adopting these changes is under way.

The increased use of power machinery and other more extensive farming methods is not the original cause of this movement, but is a result of the relatively high labor costs of the war period and succeeding years. For the time being, capital was the cheaper factor in production and farmers began to utilize it in the form of labor saving machines. The disparity in relative prices or costs has continued and so has the movement to use more power machinery. As a consequence, there has developed a tendency to look upon the introduction of improved machinery as the real cause of these changes in farming conditions. The improved machinery is itself the result of high farm labor costs and in turn is transmitting this cause to effect changes in the agriculture of the region.

The organization of individual farms within the region has been materially affected by these changes. One of the first and most obvious effects has been what might be termed a negative change for the older parts of the hard winter wheat belt. Reduced production costs have permitted the acreage of wheat to be maintained in the older eastern portions of the region and to be increased in the western portions in spite of low wheat prices since 1920. Without this reduction in the costs of production it would

probably have been necessary to materially reduce the acreage of wheat on many farms in this region. However, the wheat acreage has been maintained and increased and changes in farm organization have tended toward greater specialization in wheat production rather than toward the much heralded diversified farming.

The larger machinery used has tended to make a larger farm area desirable. Or, at least, a larger wheat acreage is desired to permit the efficient use of the larger machines. From the standpoint of the owner of the machines, the larger acreage of wheat to be handled is being secured in a number of ways. First, larger areas are being farmed as one unit. This tendency to enlarge the area of the individual farm is evident in many localities. As one prominent farmer expressed it, "the little fellow is being forced out and his land taken over by his neighbors." Another method of securing a larger acreage of wheat per farmer is to displace other crops with wheat. This has undoubtedly occurred to some degree although it is difficult to ascertain the extent of the movement because of yearly fluctuation in the abandonment of wheat due to unfavorable conditions and the redistribution of the abandoned wheat acreage among spring crops. When the movement has extended over a few more years the extent of this displacement of other crops by wheat can be more fully measured. Also, a good part of the increased acreage seeded to wheat is being made possible by the plowing up of the native grass lands remaining in the farms. This has occurred, particularly in the newer parts of the hard winter wheat belt where wheat production has been materially extended since 1920.

All these movements have increased the importance of wheat production on many farms. However, it is probable that, to some extent at least, this tendency toward greater specialization in wheat production is a temporary expedient pending the time when additional land may be added to the area of the farm.

A third method of securing a larger acreage of wheat to be handled with the available machinery that is now frequently used is to do custom work for those farmers who

do not own such machinery. In the older portions of the hard winter wheat belt the doing of custom work is now regularly practiced. However, there is reason to believe that this is merely a passing phase of the process of adjustment to changed conditions. The owner of the combine that is used for custom work must usually own the tractive power to operate it. If he owns a tractor large enough to pull the combine, it is large enough to prepare the seedbed and seed as large an acreage of wheat as his combine will harvest. This would seem to be the more efficient method of utilizing his equipment.

There are objections to custom work from the standpoint of the farmer who hires it done. The hiring of the work done may deprive the farmer of employment for his own time, particularly if the seedbed preparation and seeding operations are hired done. The farmer who hires his wheat harvested with a combine may have to delay his harvest until the combine has been used in the owner's harvest or in the harvest of some other farmer and the risk of losing the standing crop through storm damage is increased.

The ultimate result will undobutedly be farms of sufficient area to include a large enough wheat acreage to permit efficient utilization of large type tractors and combines. This is in keeping with the past trend of the size of farms within this region. Farms, at first large enough to permit efficient use of the binder, and later, of sufficient size to permit the use of the header, have characterized the region. The next move in the size of farms would seem to be toward farms large enough to permit the efficient use of combines.

If farms in the hard winter wheat belt continue to increase in size until the typical farm can utilize a combine efficiently it will mean materially larger farms. The 15 to 16 foot combine is now the more typical machine in use. A combine of this size can readily harvest 500 to 700 acres of wheat in addition to other small grains. If reasonable allowances are made for spring crops, for fallow land, and for pasture, an efficient size of farm would appear to be 1,000 to 1,280 acres. If larger combines are used the

acreage would be correspondingly increased and it is not improbable that there will be many efficiently organized and operated farms of three to five or more sections.

The establishment of the desirability and efficiency of farms of such sizes can be readily done by the use of methods such as have been used in Minnesota Bulletin 205 "A Study of Farm Organization in Southwestern Minnesota" and U. S. Department of Agriculture Bulletin 1296 "A Study of Farm Organization in Central Kansas."

With the coming of larger farms, problems of land tenure may become more acute. If an efficient farm unit includes one to three or four thousand acres of land valued at $25 to $75 an acre, and the equipment to farm it costs $5,000 to $25,000, the total investment per farm will be from $30,000 to $325,000 or more. The larger sums are much greater than the usual farmer can reasonably expect to accumulate in a life time. The sum required to purchase the equipment is greater than the life time savings of many farmers. The farmers who handle the land, if owners, will have far greater wealth per man than most of the better farmers of the present are acquiring. It would seem probable that many farmers would farm land under leases. The ownership of the land, whether by individuals, by corporations, or otherwise, presents a problem that as yet is unsolved, but will be exceedingly interesting as it is worked out.

This trend toward larger farm units is becoming increasingly evident each year. Many of the smaller farmers with their more obsolete equipment are being forced to secure newer equipment and to farm larger areas or are losing their farms through bankruptcy and foreclosure or other similar methods. At least one corporation has been formed to farm a large area (50,000) acres) using improved methods and the newer, large type machinery. The question at once is raised concerning the future agriculture of the region. Will it be a region of large corporation farms resembling industrial units or will they still remain the family size farm that has been characteristic of American agriculture? No adequate information appears to be at hand to answer this question now.

Conclusions

In view of present trends in the use of improved production methods and farm machinery in the hard winter wheat belt the following conclusions seem justified.

The area per farm is increasing and will undoubtedly continue to increase. This movement is proceeding most rapidly in the newer sections where the resistance to changes in land tenure is less pronounced than in the older, more firmly established parts of the region.

The immediate effects of these changed conditions appear to be increased specialization in wheat production and the use of the combined harvester-thresher for custom work. Both of these moves may be but temporary expedients adopted to permit the handling of a larger wheat acreage per man and can be expected to disappear, to some degree at least, as the size of farms is slowly increased.

The sizes of combines and tractors now most commonly used in this region require farms of 1,000 to 4,000 acres to permit their most efficient utilization. This is two to four or five times as large an acreage as is included in the present usual farm of the area.

An increasing size of farms, if it materializes, will result in reduced farm population, and the number of people and institutions needed to serve these rural communities will be decreased. The extent of the effects of this movement may affect the number and the geographic limitations of political units within the region. Problems in credit needs, in land tenure, and in marketing will develop which in turn will have their influence on the organization of farms within the region. The extent of these changes and of their influence can hardly be conjectured at this stage in the development.

PROBLEMS IN CROP AND LIVESTOCK ESTIMATING

W. F. Callander

Bureau of Agricultural Economics

The work of making estimates of crop production and numbers of livestock on farms is one of the oldest projects in the Department of Agriculture, having been carried on systematically since 1863. From rather simple beginnings the work has developed until today the various activities carried on by the Crop Reporting Service involve almost innumerable statistical problems, many of which will require long and careful investigation and research before they are satisfactorily solved.

No doubt most of the members of this Association are familiar with the long established lines of work of the service, such as reports on acreage, yield, and production of crops, farm prices and farm stocks, and use the data in various ways, but possibly they are not so familiar with some of the newer activities such as the intention-to-plant and intention-to-breed reports, the gathering of data on the disposition and utilization of crops, the development of methods of estimating the annual production of livestock, and livestock products, which is quite a different problem from that of making the annual inventory, and the collection of information on egg and milk production, to be used as a basis for a current index of production of these products. The forecasting of crop production in advance of harvest, which involves many problems difficult of solution, was begun as recently as 1912.

Prior to 1912, the work of crop estimating consisted to a great extent of making estimates of the current acreage, yield, production, and December 1 price and "farm value" of the more important crops, and a January 1 inventory of numbers and value of livestock. During the growing season a condition figure was published on the first of each month for the more important crops. No effort was made to interpret this condition figure in terms of probable yield. The Federal census, taken every ten years, was used as a

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principal basis for changes in acreage and numbers of livestock. The yield per acre, and December 1 price of all crops, and January 1 value of livestock, were obtained annually from crop reporters and other sources. The estimated change in acreage was based almost entirely on a so-called "judgment inquiry" to crop reporters, in which the reporter was asked to estimate the acreage this year in percentage of last year, with last year as 100 per cent.

The work was primarily a problem of the continuation from one ten-year census base to the next of acreage, production, and numbers of livestock. A glance at our published records shows how very inadequate have been the methods for this purpose. The yield per acre and price data have been reasonably satisfactory, but the accumulation of bias in connection with acreage changes and changes in numbers of livestock is illustrated by the abrupt breaks in the series with nearly every new census enumeration. The problem has been further complicated with census enumerations that in many instances have been inadequate, have related to varying dates, or with which the methods and completeness have varied from one census to the next. At the present time we are working on the problem of adjusting the crop acreages and numbers of livestock to the various census bases as they have occurred. The yield per acre data are also being studied in connection with this general revision. Our published estimates of production have not been satisfactory for use as basic material in connection with correlation studies such as the determination of the factors influencing prices, because of these abrupt breaks which occurred with the successive census enumerations. In the revisions, which we have not undertaken, an attempt will be made to adjust the acreage backward as well as forward from each census base, with some allowance for incompleteness of census data. This will overcome the necessity now often experienced for research students to use the straight line trend as the basis of acreage between census periods.

Fundamentally, the two outstanding developments of the past ten years have been (1) the gradual elimination of nearly all "judgment" or "opinion" methods of collecting

information, and the substitution of the "sampling" method, and (2) the collection and utilization of objective data, such as railway shipments, market receipts, as check data not only upon total production, but upon the sample itself.

General Problems of Estimating for Field Crops

Sample data.—The development of the sampling technique has gone hand in hand with the revelation by check data of the shortcomings of the various types of samples. In line with customary past procedure in stating current acreage as a percentage of the preceding year's acreage, the first few years in the use of sample data the estimates of changes were based on a "two-year comparison" of acreage, i.e., the farmer reporters were asked to report acreage on their farms this year and last year, and the percentage of change was calculated. Check data, however, revealed some serious shortcomings in this method. Memory "bias" of last year's crops, intentional understatement of current acreage of cash crops, variation in the reaction of these "self-selected" reporters from the reaction of farmers as a whole to prices and other factors affecting acreage, were apparent in this type of sample. Measurements of this "bias" have been made and are used in the analysis of these data. Shortcomings of the "two-year comparison" method were found to be eliminated by the next approach, that of "the ratio relative." The number of reports was greatly increased and the ratio which each crop bears to total farm land, to total crops, to total crops except hay, etc., on the farms reporting, was computed from the acreages reported for the current year. These ratios for successive years were then divided by one another to secure "ratio relatives." A closer agreement with check data, by the elimination of "memory bias," the partial elimination of under-statement of acreage of cash crops resulted. However, the shortcoming attributable to the fact that these self-selected farmers were "out of step" (usually ahead) of the procession of average farmers still remained.

In 1924 the collection of a more nearly random sample

through the rural mail carriers was begun. This sample was less selective as revealed by such measurements as "average size of farm," "average acres in crops," etc., and represents our present nearest approach to accuracy as revealed by check data. A modification of technique both with respect to mail and rural carrier samples, in areas, has been in the comparison of changes on "identical farms." That is, reports each year from the same farm. In some States sufficient returns are now being received to make it possible to compare a large number of identical farms for two years. A moment's consideration, however, will disclose the great unsolved problem still before us, which we have ever in our minds, and for which a somewhat arbitrary discount must be made. Both mail and rural carrier samples deal with individuals living on farms *now;* they relate to land units *now* operated. Nothing in the sample itself can reveal *who* was on a farm last year and not *now,* or *now* and not last year, or what unit of land was operated last year and not *now,* or *now* and not last year. In other words, in a region of expanding agriculture, these samples understate acreage, in a region of declining agriculture, they overstate acreage. Fortunately, in the great "bread basket" of the Middle West, these changes are very small, but in other areas, they are important, and ways and means must be devised to go outside the sample to measure this influence.

Three or four years ago one of our field men invented what we call a crop meter, which is a measuring instrument which can be attached to an automobile and by means of which the number of feet in each kind of crop along selected routes may be measured from year to year. These meters have been made to cover about twelve crops, but we are now making one that will have dials to cover double this number. This large meter can be used either for measuring every kind of crop along one side of the road, or may be divided and the measurements taken on both sides of the road at the same time. Already we have had some rather interesting results from the use of this crop meter, and it is possible that it may help us to solve some of our problems with respect to new land coming in, pasture, etc.

We have come to the conclusion that sooner or later, for the solution of these problems, we will have to use another method of collecting sample data from farms. When the information is gathered through the rural carriers, or by mail, there is a tendency to obtain a selective sample which is not typical. If sample data could be gathered from year to year, by paid enumerators taking all the farms for an entire "sample" area, the same identical area each year, possibly a township or a group of school districts, or all of the farms along certain roads throughout each county, the results would probably be much more satisfactory than we can ever hope to secure either through the rural carriers or by mail. This plan, which will be put into effect whenever the funds become available, will be to select, in co-operation with the agricultural colleges of the different States, a sufficient number of typical areas throughout each State, to be truly representative, and employ paid enumerators who will take these partial censuses each year. It is probable that the best time to take these enumerations will be in the fall, possibly beginning the first of October, after much of the acreage of all crops has been harvested, and the abandonment due to weather and other causes is pretty definitely known. We believe that a 10 per cent sample of the United States could be taken every year in this way, for about a half million dollars a year. The results of these enumerations, we believe, would not only be useful in the work of estimating crops, both for acreages and yield, but would also afford a vast amount of primary data, which would be extremely valuable to agricultural colleges in the studying of farm management problems, farm income, land economics, tenure, and marketing. If this plan can be put into effect, the schedules to be used in each State would be carefully studied with a view to making the information gathered useful to as large a number of agricultural investigators as possible.

Forecasting yields. In 1912, at the request of the International Institute of Agriculture, the Bureau began to forecast the probable yield per acre from the condition figure. A method of "pars and normals" was worked out, which is still in use. It is a very ingenious system, based on

the formula: $\frac{\text{ave. yield} \times \text{current condition}}{\text{ave. condition}} = \text{current yield}$;

i.e., the condition of the growing crop will bear to yield a relation proportional to that borne by condition to yield in an average year. This method necessarily assumes prevalence of average weather, and other influencing factors during the remainder of the season. Deviations in such subsequent influences from the average raise or lower the prospective yield. There are years when a wind in Kansas, coming after the date of the early forecast, may greatly reduce the outturn of the wheat crop in that State. A black rust infestation in the spring wheat belt may also have a disastrous effect on the wheat crop in that area. The earlier in the season the forecast occurs, the more likelihood there is that some unusual weather conditions will cause a change in crop prospects. Early forecasts cannot be expected to be as reliable as later ones. If someone could devise a method of forecasting the weather, it would greatly facilitate the work of crop forecasting. This past year's experience with long range weather forecasts pointing to a corn crop failure in the Middle West, illustrate some of the difficulties involved. Briefly, the methods of "pars and normals" is as follows:

The crop reporters are asked to report on the condition of the crop in percentage of a normal or full crop. This average condition figure for a given State and crop is applied to the "computed par," and the product is the probable yield per acre as explained. If the reported condition figure on the average tends to become smaller and smaller as the season advances, the par must become progressively larger in order to compensate for the average decline in the condition figure as reported.

If the condition figure on corn for September 1 is plotted on the horizontal axis of a dot chart, with the yield per acre as reported the ensuing November on the vertical axis, we then have a picture of the relationship between the condition and final yield as reported by the correspondents of the Department. If the par, based on averages as explained, is plotted on this chart also, we find that it forms a straight

line, beginning at zero and ending with the par in bushels plotted on the 100 per cent condition line. In other words, the par assumes a straight line relationship. In actual practice, we find that a straight line of this particular slope is not always the best fit for the dots as plotted. The par is based primarily on the ten-year and five-year relationships, with some allowance made for the three-year average relationship. This is done in an attempt to take care of the trend in yield. For the past two seasons the Crop Reporting Board has adopted a policy of changing the par, as previously calculated, on crop report day, when special conditions arise which seem to warrant such a change. The Board appreciates that the straight line relationship, such as is assumed by the basic par, cannot, in all cases, be the best interpretation of the condition figure as reported. For a number of crops some phenological data are now being collected and are to serve as a basis for such departures.

Recent studies have shown that the condition times the par is a highly satisfactory method of forecasting the yield per acre for major crops, such as cotton, wheat, corn, oats, barley, and so forth. In Kansas, for example, the correlation between the correspondents' reported condition of corn on September 1, and the final yield for a period of 25 years was a plus 0.984. The regression line ran parallel to and within a half bushel of the par. At the other extreme, however, we find in the State of Maryland that the May 1 condition of winter wheat shows a minus correlation of about 0.40, with the final outturn of the crop. The highest yield on record came in 1926, when the May 1 condition was the lowest on record. This condition exists to a somewhat smaller degree in Pennsylvania, Virginia, and North Carolina. A study of the relationship between condition and final yield 30 years ago in Maryland, shows that there was a positive relationship between condition and final yield. This complete change in relationship has probably been brought about by losses due to a disease known as "septoria," which seriously damages the wheat kernel when the weather is damp and humid while the wheat is filling. Apparently a thrifty vegetative condition is caused by the ample moisture which increases the prevalence of the septoria.

Studies have been made showing the relationship of weather to crop yields. No organized method has, as yet, been made to use weather data to supplement the condition figures as reported by our crop correspondents. We are now working along that line, but our resources for research are closely limited by the pressure for current reports.

Theory of Sampling.—The theory of sampling is involved in all the inquiries made by the Division. In only a few cases are we able to go out and by actually counting determine how much there is of anything. Neither time nor funds permit annual complete enumerations. Crop forecasts must usually be estimates based on sample data. Practically every inquiry which we make is a problem in sampling. From sample data we obtain the average yield of wheat or cotton for a given State. Either we assume that our sample is a reasonably true one, or we make some correction for bias. In connection with all sampling problems we must consider, first, is this sample representative of the "universe" that we are sampling? Representativeness applies geographically with all of our reports. It applies to the individual reporting when sample acreages are obtained. It even applies to the size of farm in connection with an acreage inquiry.

Along with the problems of bias and lack of representativeness, we are confronted with the problem, to what extent is the average of our sample influenced by the "fluctuations of sampling?"—would we expect to get the same results if we had a larger sample taken under the same conditions?—how many reports do we really need for the inquiry?—do we need as many reports with apple yield data as with corn yield data, with yields as with price data, with wheat prices as with apple prices, or land value figures?—what determines the number of reports needed to give us an average which will not be too greatly influenced by the fluctuation of sample?

There is probably no branch of the general field of statistics which is more vital to our work than that of the theory of sampling. Very little work has been done in this country in this field. We have published one bulletin, No. 1480, "The Reliability and Adequacy of Farm Price Data,"

which deals with the problem of sampling in connection with the collecting of farm prices. More studies somewhat along the line of this bulletin may be expected to appear from time to time from our Bureau. We are anxious to give the research worker and the student our own appraisal of the methods which we are using with their apparent limitations. There is too much of a tendency for the novice in the field of economic research to accept the figures as published without question, merely because they are published by a governmental agency.

Correlation and the Study of Relationships.—The use of the multiple and curvilinear correlation is especially applicable to the forecasting of probable yield prior to harvest. It would also be useful in the field of acreage determination or the determination of acreage changes from year to year. Very little work has been done along this line. The technique used by the workers in the field of price forecasting is more or less applicable to the study of the relationships in the field of crop and livestock estimating.

Along with workers in other fields, statisticians in the Division of Crop and Livestock Estimates are developing a special technique for a special field. The use of the par in forecasting the probable yield per acre, the use of ratios and ratio relatives in connection with the determination of acreage changes and studies of bias are peculiar to this particular field of crop estimating. The use of correlation and the theory of sampling has possibilities which are being developed. The greatest value which we have so far obtained from these last two is in pointing out the limitations of our present methods, and in suggesting possible refinements which will increase the accuracy of our forecasts and estimates in the future.

Fruit Crop Estimating

The estimating of the production of tree fruits such as apples, peaches and pears, presents problems quite different from those involved in the estimating of crops planted annually. In the estimating of such crops there is involved not only the change in the number of bearing trees, but in the age and productivity of the trees. During the past ten

years there has been a rapid shift from farm production to the production of much of our fruit in commercial orchards. While the total number of fruit trees in the country is probably less than it was a decade ago, the total production is probably increasing because of the better care given the orchards. All of these problems need the most careful study and, unfortunately, the Division has neither the personnel or the funds for carrying out the needed investigations.

The quantitative estimates of fruit production issued by the Department are based primarily upon the relation of the condition reported by correspondents in census years with the production of fruit as reported by the census in such years. It will readily be seen that unless the census year happens to be an average year the basis of the fruit estimates is likely to be considerably affected. For instance, should the census year be one of tremendous overproduction, such as 1926, when a large quantity of fruit was wasted, the quantity reported harvested is only a small part of the actual quantity of apples produced. There is probably no other crop for which basic data are more urgently needed than in the case of tree fruits.

In estimating fruit production, one of the outstanding problems is to secure adequate information on the utilization of the fruit produced so as to secure a check on the current estimates of production; such information also provides those engaged in the production and distribution of fruit with a more complete picture of the supply situation in all its terms.

A mere count of the number of bushels of apples on the trees does not by any means provide the information needed by either producers or dealers; and estimates of the quantity of apples that will be marketed as fresh fruit are not as helpful as one would at first expect. The quantity of fruit consumed varies much less from year to year than the estimates of production would indicate, deficiencies in production being often largely offset by closer utilization of the lower grades, and by a reduction in the quantity used for manufacturing purposes. Thus in years of extra heavy production, the quantity of apples sold for consumption as

fresh fruit is more a measure of the quantity that people are willing to pay for than it is the quantity available for such use. So it is with other fruits. This year about 2,700,000 bushels of peaches were wasted in California alone, because of the low prices paid for some types of canning peaches. Those who are figuring on the quantity of peaches available this season must include this potential California supply, but those who are figuring on fruit consumption or values, should exclude this quantity which was not utilized. So it is with all other fruits. It is impossible to have one figure on production which will answer the needs of all those working with fruit statistics. A difference in quality that decreases the quantity of a fruit available for shipping may mean an increase in the quantity available for some manufacturing purposes.

In California we have quite satisfactory statistics on the quantity of fruit utilized for each purpose, and when the season is over we can revise the estimates of production on the basis of the quantities dried, canned, shipped, etc. When equally complete statistics are available for fruit production and utilization in the other States, we will have a much more complete picture of the whole supply situation and growers will be able to eliminate some of the present marketing costs and losses.

The other outstanding problem in the field of fruit estimating is to secure that basic information on the trend of future production which is needed by all those who are planting fruit trees. The man who plants an apple orchard must figure on the market supplies ten to twenty years later. He must figure not only on the supplies in competing sections but also on the prospective competition between varieties and between fruits. The Department has as yet made only a bare start on securing this basic information.

Problems in Livestock Estimating

The problems involved in estimating the number of livestock of different species on farms (taking an annual inventory) and in estimating the quantity and value of annual livestock production, are considerably different from those encountered in estimating crop production. They are

quite as difficult of solution, however, and it is only within the last four or five years that real progress has been made. These problems also differ as among different species of livestock. For example, hogs are produced very largely as a meat crop, they are marketed or slaughtered on the average when less than a year old, the basic breeding stock is small compared with production, and yearly changes in numbers produced may change markedly; on the other hand cattle are marketed at all ages, from calves to worn out dairy cows; to a considerable extent they are produced primarily for other purposes than slaughter, the basic breeding stock is large compared with yearly production, and increases in numbers can be brought about but slowly.

Until a few years ago the activities of the Department as regards statistics of livestock production, were directed largely to securing inventory numbers. The estimate of the number and value of livestock on farms, made as of January 1, was the principal livestock estimate of the year, and, as with crops was based upon judgment inquiries, with but little effort to adjust for the bias which nearly always exists in such data. This accounts for the radical revisions which have sometimes been necessary, following a new census. While a yearly inventory of livestock numbers is much more significant for indicating livestock production than a similar figure for grains, hay, or cotton would be for indicating production of these crops, it was at best entirely inadequate to furnish a basis for arriving at the annual number and value of livestock produced. Little or no information as to the actual amount of livestock production, even after the close of the year, was secured, and practically nothing was sought as to the amount of production as it was taking place and in advance of the movement to market.

At present the livestock activities of the Division of Crop and Livestock Estimates are being centered more and more upon securing information of production, and methods are being developed for obtaining such data currently and publishing them well in advance of the time when the supply will be marketed. Because of the comparatively short interval of time between birth and marketing of hogs and

lambs, information as to current production is of greater utility with these species than with others. While considerable progress has been made in this field, much still remains to be done to develop a satisfactory statistical technique.

Pigs are raised generally as two crops, a spring crop and a fall crop, so that it is necessary to prepare two reports a year on pig production. Lambs are a single crop, born largely between March 1 and June 1, hence only one general estimate of the lamb crop is made—in July; this is supplemented, however, by reports on the early lamb crop in those States where large numbers of lambs are born before March 1; and marketed before July, so that producers and the trade may be advised as to the prospective numbers of early lambs.

In addition to estimates of numbers on farms and of production a number of estimates of short period supplies are made. These include estimates of cattle and sheep and lambs on feed for market on selected dates during the year, prospective marketings of western cattle over seasonal periods, the fall shipments of western lambs, etc.

The securing of dependable information upon which to make these various estimates, and checking the accuracy of the estimates as made, present some interesting problems, some of which are not easily solved. As with crops, the census enumerations are used as the basis for estimating changes in numbers between census periods. The changing of the time of taking each census, with which you are all familiar, has greatly increased the difficulties of making estimates of numbers as of the same date over a period of years.

In general the basis of most of these estimates of changes in numbers in intercensal years, is the individual farm sample. The problem of such sampling is to secure large enough returns, properly distributed, to be representative. For these livestock reports these sample data are secured from regular and special lists of reporters, and from schedules distributed by the rural carriers of the Post Office Department. The sample secured by the latter method is probably a better one than that secured from regular re-

porters, since the latter tend to represent the better and more stable producers.

As with acreage, the preparation of questionnaires that will furnish the desired information, and yet be simple enough to be understood by the reporters is not an easy matter. One of the difficulties is to adopt words and phrases that have the same significance in all parts of the country. For example, the pig survey cards ask for the "number of pigs saved" from all litters farrowed during a stated period. Over a large part of the Corn Belt, the principle hog producing area, the phrase "pigs saved" has a rather general specific meaning, which is, pigs that lived to be several weeks of age. In other sections, apparently, this phrase does not have such a meaning, and it is often difficult to determine what the reporter actually has in mind. But great caution is needed in changing the wording of schedules, both because the new schedule may turn out to be no better than the old, and because the comparability of the returns for the two years may be affected.

Covering the last seven years the Division has been obtaining quite complete information as to monthly and yearly movements of livestock by States, for the principal producing States. This includes shipments into, as well as from, these States and makes possible a computation of the new output. On the basis of such information and sample data covering other items, balance sheets of livestock numbers per State, showing items of increase and decrease during the year, together with numbers at the beginning and end of the year, are being prepared. The information secured by sample, covering such items as births, deaths, and farm and local slaughter, is rather uncertain, since it involves a correct memory of such items by the reporter covering a number of months. That there is considerable memory bias in such returns seems certain, but it is difficult to measure this from sample data alone, for the representativeness of the sample is always in question. At the same time such census data as there are covering these items, are apparently lacking in dependability as giving absolute numbers that can be used as a basis for estimates.

For checking estimates of numbers on farms and other

similar estimates, the marketing figures are of much use for some species. The best information for such checking purposes for cattle and horses and mules is that obtained from the assessment figures which are available for all of the principle livestock States. The yearly changes in assessments, except under abnormal conditions which tend to affect the normal proportion of animals returned for assessment, are probably the best indications of yearly changes, and especially of trends over a period of years of all data. These, however, are only available for checking the estimate of the previous year. For the current year sample data of various kinds must continue to be the principal source of information.

Interpretation of Statistics

One other serious problem in estimating is the problem of expressing the results in terms that will not be misunderstood. All of those using the figures should understand that there is no one acreage, no one production, and no one price that will answer all statistical needs. There is one acreage that is planted, there is another acreage that is left standing to maturity, there is another acreage that is harvested, another acreage that is threshed; there is one production representing what could have been harvested, there is another that represents the quantity actually hauled from the fields, there is another that represents potential market supplies after allowing for shrinkage and dockage, seed and farm consumption; there is one class of prices which represents the average price which the farmer receives. This may be entirely different from the unit value of the total quantity produced, including quantities unfit for sale. The change in the average price is also affected by the change in quality and may also differ markedly from the change in the price of a standard grade.

The various workers in the field of agricultural economics must adapt the Department's figures to their individual needs. In time, the Department may be able to supply figures adapted to the needs of individuals, but for the present, our efforts must be concentrated on securing accuracy in those figures which we now publish.

AN INTERNATIONAL ORGANIZATION OF NATIONAL FARM ASSOCIATIONS[1]

ASHER HOBSON

INTERNATIONAL INSTITUTE OF AGRICULTURE, ROME

From time to time during the past forty years, there have been in Europe well-developed movements toward the founding of some sort of international agency controlled by, and representing, the organized farmers of the world. Within the past five years such a proposal has been under constant and serious consideration by leaders of co-operatives. At nearly every international meeting where farmers' representatives were gathered the question came up for consideration. Rivalry between international agricultural organizations, together with conflicting interests as to the form of the proposed union, and the scope of its activities, resulted in the concoction of many sleeping potions which were administered to any definite proposal calling for action. But this was not a drowsy idea. It refused to sleep.

Curiously enough, it was an American suggestion which gave added impetus to the movement. The American Delegation to the 1924 General Assembly of the International Institute of Agriculture introduced a resolution inviting the agricultural associations of all countries to consider the advisability of forming an international secretariat to represent the interest of the organized farmers of all nations.

As a result of these resolutions, the representatives of agricultural associations attending the General Assembly met and nominated a temporary committee and instructed it to study the question with a view to recommending a definite program of action. Dr. Ernest Laur, director of the Swiss Farmers' Union, was placed in charge of this temporary organization.

The Bern Conference

A series of international conferences culminated in meetings held in Bern, Switzerland, on September 22 and 23, 1925. These meetings were attended by the representatives of agricultural associations from 17 countries.

[1] This paper was read at the eighteenth annual meeting of the American Farm Economics Association at Washington, D.C., December, 1927.

The issues which arose at this conference demonstrate clearly the difficulties encountered in the promotion of such an undertaking.

The four distinct, and in some measure, conflicting proposals before the Bern conference were:

(1) *The proposal of Dr. Laur,* which embodied the following fundamental principles:

(a) That there be founded immediately a temporary organization known as the International Conference of Agricultural Organizations.

(b) That the Bern Meeting adopt articles of association outlining the work of this temporary organization.

(c) That the headquarters of the temporary organization be at the place of residence of the Secretary-Director appointed to take charge of the work.

(d) That expenses be defrayed by assessing each member organization 500 gold francs ($100) per year.

(e) That all funds not used for current expenses be accumulated until the accumulated fund reaches a total of 200,000 gold francs ($40,000).

(f) When this amount is in hand an International Union of Agricultural Organizations is to be created, and the temporary International Conference of Agricultural Organizations will cease to exist.

(g) The question of the place of location of the permanent Union to be left open until that organization is founded.

(2) *That of the Italian Delegation,* which insisted that any machinery set up should be a definite part of the International Institute of Agriculture at Rome—which is a Government body. The American Delegate to the International Institute of Agriculture, as observer for a number of National Farm Organizations of the United States, opposed these proposals on the ground that it was contrary to the principles of co-operative development in the United States. He stated that co-operation in the United States had developed along self-help lines, and that while the organizations wished at all times to be in a position to co-operate

and collaborate with official bodies, they also wished, above all, to be free to commend or criticise the actions of existing organizations according to the dictates of their own interests.

(3) *That of the French Delegation,* which was opposed to the creation of a new International Union of Farmers' Organizations on the grounds that existing organizations were sufficient, if authorized to enlarge the scope of their activities. The delegation held that the International Commission of Agriculture with headquarters in Paris should represent the organized farmer.

(4) *That of the German Delegation,* which wished to limit the activities of the proposed agency to the staging of regular conferences to be held at the time and in conjunction with the biennial General Assemblies of the International Institute of Agriculture in Rome.

In addition to these conflicting points of view, the National Farmers' Union, of England, refused to adhere to a new association on the ground that the "International Organization of Farmers" was quite sufficient. This organization acts solely in an advisory capacity to the International Labor Bureau at Geneva on questions of agricultural labor.

Another conflicting note was the establishment, immediately after the Bern conference, by the International Institute of Agriculture, of what is known as A Permanent Commission of Agricultural Associations. This Permanent Commission is a child of the Institute and wholly controlled by it.

Unfortunately, the directing interests of the Institute have taken the stand that the Institute is supreme in dealing with the international phases of agriculture. In numerous instances it has discouraged the founding of new agencies even though they be interested in specialized portions of the field.

The American Delegate to the Institute has always held that the Institute as an official body should not attempt to occupy the field to the exclusion of all other organizations, but instead should attempt, through the channels of voluntary co-operation, to promote and co-ordinate the activities

of organized effort in the international field of agriculture.

An inventory taken after the Bern conference showed that 18 organizations in 11 countries were willing to join and support a new and independent association. But Great Britain, France, Italy and Germany were not among the 11 countries. The associations of the United States took no action on the matter. Hence the Bern conference demonstrated clearly that if some of the larger countries were to be attracted it was necessary to adopt, in some measure, one of the plans advanced by them.

It became evident, also, that a beginning could be most easily accomplished by an amalgamation with some existing organization.

This feat—and it was no less—was brought about by placing the International Commission of Agriculture under the complete control of adhering national farmers' organizations.

The International Commission of Agriculture

The International Commission of Agriculture, with headquarters in Paris, was organized in 1891 by Jules Meline, former Minister of Agriculture of France. This commission was composed of representatives elected by the commission itself. These representatives were chosen from among government officials, agricultural scientists, representatives of farmers' organizations and agricultural leaders generally. Government officials predominated. For the most part the Commission confined its attention to the holding of international agricultural congresses. These congresses, with the exception of the war years, were held every two years in different European countries. The expenses of the congresses were, for the most part, defrayed by the governments of the countries in which they were held. The programs were wholly in the hands of local organizing committees.

Hence the activities of the Commission were of a get-together nature, without a definite target, and practically without limitation of scope. Its benefits were largely those of providing a pleasant environment and opportunity of contact with agricultural workers of other countries.

In discusssing the proposal to unite with the International Commission the American Delegate to the International Institute of Agriculture insisted again that any international mouthpiece for the organized farmer, if it were to be of interest to the American groups, must be free from outside alliances and influences and under the entire control of the adhering national associations. He was of the opinion that it was quite essential that the proposed organization have perfect freedom to co-operate with, or criticize at will, other organized forces operating in the field of agriculture.

In the mind of the American Delegate, the best plan was to create an entirely new international federation with membership limited exclusively to free national farmers' associations. But, as has been said, such a proposal always met with strenuous opposition from existing international agricultural bodies on the ground that instead of creating new organizations, those in existence should be utilized. Hence, in order to eliminate some of the conflicting opinions, it seemed best to affiliate with an existing international agricultural body with a view to changing its form of organization rather than to establish an entirely new body in opposition to the existing ones.

The International Commission of Agriculture possessed the merits of being a going concern of long standing, and well known throughout Europe in agricultural circles. In addition, its officers readily consented to propose to its membership a modification of its by-laws in such a way as to place the Commission under the exclusive control of representatives of national farmers' associations.

These modifications were discussed and ratified on March 22, 1926. Hence the affiliation with this existing body by the promoters of an international secretariat of co-operative associations was a sort of "marriage of convenience." But the complete revision of the purposes and control of the International Commission promises to develop into a "marriage of love" as well.

The important provisions of the revised statutes are:

(1) Membership is composed of agricultural associations and individuals.

(2) Only delegates specifically designated by the agricultural associations have a right to vote.

(3) International agricultural congresses are to be held every two years as usual.

(4) The first section of the congress is to be known as "The International Conference of Agricultural Associations." Only delegates of adhering associations have a right to attend the meetings of this section. Its actions are not submitted to the plenary sessions for ratification, but are transmitted direct to a permanent secretariat of the International Commission for execution.

(5) The minimum annual fees for adhering associations are 200 gold francs, or $50. Of this amount $10 goes to the congress budget, and $40 goes to the Permanent Secretariat of the International Agricultural Associations.

At present the International Commission is composed of 80 organizations of 22 different countries. Its existence is an accomplished fact.

Adherence of American Farm Organizations

The question of the advisability of the active participation of the farm organizations of America in this new international movement is a question which only the organizations themselves can decide. It is presumed that a serious consideration of this question hinges largely upon the program of activities adopted by the re-born International Commission of Agriculture, and the probable effectiveness of this program.

This program will depend largely upon: (1) the number of associations adhering and the funds made available through their membership, (2) the desires of the adhering associations, (3) the capabilities of the directing heads.

It is not the purpose of this paper to suggest that American co-operatives adhere to the International Commission. But it is suggested that they thoroughly familiarize themselves with the conditions surrounding the organization and its probable benefits, with a view to deciding whether it be to their advantage to join. To this end some basic facts are submitted for consideration.

1. The founding of an International Secretariat of Co-

operative Associations is not a scheme of the professional promoter. It is in the hands of recognized leaders of agricultural co-operation in Europe. Its President and Vice-presidents are international figures in the field of co-operation.

Marquis de Vogüé, President of the Farmers' Association of France (Societé des Agriculteurs de France), is also President of the International Commission of Agriculture. He has long been identified with agriculture in its international aspects.

Dr. Ernest Laur, Secretary of the Swiss Farmers' Union (Union des Paysans Suisses), in charge of the section known as the Secretariat of the International Conference of Agricultural Associations, is one of the Vice-presidents. Dr. Laur has been the leader in this international movement. He is its strongest exponent, and is known throughout Europe for his unselfish devotion to the cause of organized agriculture in his own country. He has been Secretary of the Swiss Farmers' Union since its founding in 1897. The Swiss Farmers' Union represents a high accomplishment in the field of co-operative farmers' organizations. It has united the farmers of Switzerland into one solid group. It is a union of 52 federations, having in 1926 a total of 402,000 members. This is about 150,000 more members than there are farms in Switzerland. This situation is due to the fact that many farmers are members of more than one association or federation belonging to the Union.

Although Switzerland is a small country, the difficulty involved in Dr. Laur's task is appreciated when one realizes that it is a country having three distinct official languages—French, German, and Italian, each garnished by a number of dialects. In addition, these language groups possess customs and a pyschology entirely different from each other. As far as language and types of people are concerned, the Swiss Farmers' Union is in reality an international institution. This fact, together with his long years of experience, and the solidarity of the co-operative movement in his country, makes Dr. Laur an outstanding leader in agricultural co-operation in Europe today. He is, in fact, director of an international farmers' organization in his own country.

2. The last few years have seen the rise of influential international bodies, such as the League of Nations, the International Labour Bureau—both of which deal with agricultural matters—and the International Institute of Agriculture. Indications are that organized agriculture needs a thoroughly capable and independent international mouthpiece through which to express its views and desires to these bodies.

3. The welfare of the agricultural classes of one country is becoming more and more dependent upon the welfare of the agricultural classes of other countries. For instance, one of the possible goals toward which the international secretariat of farmers may strive is that of raising the standard of living of farmers throughout the world, by assisting in formulating public opinion concerning the position of agriculture in each country, in order that it may receive a share of the national income of that country proportionate to its importance and responsibilities.

Few things would be of greater benefit to American agriculture than the raising of the standard of living of farmers in other countries. The farmer of this country will never be upon an equal basis of competition with farmers of other countries as long as the standard of living of the farmers of other countries is below that of the American farmer. At the present time the American farmer is competing on foreign markets with a standard of living and wage rates universally lower than those of his own country. To support an international organization designed to raise the standard of living of farmers generally is to support a movement designed to place the farmers of all countries on the same competitive basis—certainly a progressive move.

4. The primary function of the international body is perhaps best defined in the statement that "*While the movement seeks to strengthen international relations, agriculture is none the less established on the rock of the national idea: the international movement is only a means of fortifying her national dominion.*"

5. It is well, perhaps, to emphasize again that the effectiveness of this international organization depends upon a number of unknown forces which can only be discovered and

developed by the trial method. Funds that may be available, the spirit of solidarity, and the unity of action expressed by adhering organizations are important forces which are incapable of measurement at this time.

The movement issues a challenge to the organized farmers of this country, if one accept the thesis that the struggle on the part of agriculture for a greater portion of the world's income is a problem involving international action on the part of the farmers themselves.

BOOK REVIEWS

Economics of Land Reclamation, by Ray P. Teele. (Chicago & New York; A. W. Shaw and Company, Limited. 1927. Pp. 329.)

In presenting certain differences of opinion concerning this book, which on the whole is an excellent portrayal of the reclamation situation, it must be born in mind that the reviewer is speaking of the work of a sincere friend who is not here to reply in rebuttal, but who heard these points of difference and still maintained his own point of view. His viewpoint is the result of an environment in which over-production and its cure have recently demanded a great amount of attention. That of the reviewer is of the West where the chief objective is to make irrigation a success but also where surplusses cloud the agricultural horizon.

Before discussing his policies, it is necessary to get the picture of the economic condition in reclamation projects which the author has so courageously and skillfully presented and which leaves no doubt in the mind of readers that reclamation is in need of improvement.

Lands reclaimed and capable of reclamation by irrigation and drainage represent very small percentages of the total land area while the value of crops produced under irrigation represents only 6 per cent of the total value of crops produced in the United States. When State figures are examined, however, irrigation takes on a more important rôle. In Nevada, 94.4 per cent of the improved land in farms was irrigated in 1919; in Utah, 80 per cent; in Arizona, 65.5 per cent; in Wyoming, 57.5 per cent; in Idaho, 55.2 per cent; and in California 35.5 per cent. Still, when irrigation is extended to its greatest possible limits, more than 90 per cent of the land in the western States must remain without irrigation.

An abandonment of about 24,000,000 acres of Desert Land Act claims, cancellations of segregations under the Carey Act amounting to more than 2,000,000 acres, and experience under the reclamation act of 1902 involving an estimated loss by the Government of more than $27,000,000, in addition to actual subsidies in the way of interest amounting to $61,000,000, signifies that much of the work of reclamation has been carried out at a loss. Of all irrigation districts organized, 26 per cent have failed.

The fundamental reason for the financial failure of irrigation enterprises "has been the lag between expenditures for construction and the utilization of land for which water has been provided." About 50 per cent of the land in irrigation enterprises is utilized for agricultural production at the end of twenty years from the beginning of construction. Of the total irrigible acreages on seventeen Federal projects, 54 per cent was not irrigated in 1924. Of all land included in irrigation enterprises, 7,000,000 acres were provided with water supply in 1919 that were not irrigated. About 22,000,000 acres of the area in drainage enterprises in the United States, averaging 14.6 years in age, had not been utilized in 1920.

The principal cause given is that there is no demand for the land. Promotion by commercial interests brings many projects into existence. The difference in average annual value per acre in favor of irrigated crops

amounts to $7.54 per acre. This is offset by annual charges resulting from costs of obtaining a water supply, leveling the land, construction of farm ditches and interest payments which together amount to $7.26 per acre. The irrigation farmer must compete with eastern producers with the freight differential against him. Costs of irrigation are increasing due to higher costs of labor and material, increasing difficulty in construction, use of more permanent construction, and to a general practice of discounting bonds for reclamation construction.

Average costs per acre should not be used to determine project feasibility or for promotion of projects. Increased value of irrigated land is not a source of income. There is only enough difference in value between irrigated and unirrigated land to pay for irrigation construction and farm distribution systems with nothing left to pay the settler for his labor and capital in other improvements. Returns from 2,593 irrigated farms indicate average gross income per farm in 1924 of $3,467, from which must be deducted $2,873 for expenditures exclusive of reclamation costs, including interest on those costs. This leaves $594 for the repayment of interest and principal on debts and irrigation costs. Interest payment on average indebtedness amounts to $294. On the basis of the balance after this is paid, the allowable costs of water under different repayment plans ranged from $35.34 in Wyoming districts to $61.67 under the Extension Act of 1914 on Federal projects as applied to farms already in Government projects. Average returns are not a guide to feasibility. Half the farms in irrigation projects in 1924 did not produce sufficient returns to pay anything for water, interest on debts, or to retire indebtedness.

The conclusion is that "lands reclaimed by irrigation cannot compete with other lands on the basis of paying for their reclamation, and that they will have to be subsidized except under unusually favorable conditions, or wait until the scarcity of other land will have increased the returns from agriculture."

Each of the arguments in favor of a subsidy for reclamation is in turn refuted. The need of making the nation self-sufficing, local self-sufficiency, creation of taxable values, public benefit, use of public funds obtained from natural resources in the States where subsidized projects are to be constructed, precedent established by river and harbor improvements—each of these arguments falls before the vigorous counter-arguments of the author. The construction of only such projects as can be built at a cost that settlers can meet, elimination of subsidy, elimination of the Government from reclamation, and the creation of irrigation districts empowered to assess costs in proportion to benefits derived, are the keynotes of the policy recommended. Under such a plan the commercial interests promoting projects would come in for their share of the costs. Similar arguments apply to drainage.

Competition of irrigated farms against the interest of those in humid regions has probably been over-emphasized by the author. It seems that the author's insistence upon limiting reclamation construction to those projects "which can be built at a cost that settlers can meet" should be accompanied by a more vigorous program of creating a technique for the develop-

ment of agriculture on reclaimed lands. The author probably under-estimated the importance of the problems of agricultural development in the analysis of the causes for the lag of utilization behind construction. The Durham and Delhi projects of California were designed to meet this need and the author states that "the distinctive features of the plans are effective if conditions remain favorable," but a more detailed analysis of the results obtained under the California Act would have been more constructive. The reviewer believes that the experiment was in the right direction and that the difficulties described by the author were due mainly to catastrophic and unusual economic conditions and to political influences. We are, however, still confronted with the task of finding out just what type of institution will most effectively handle the difficult problems of rural development in reclaimed areas.

Reclamation projects are often successful only because the settlers are able to build upon the failures of their predecessors, gradually creating a security behind the bonds of the projects. The reviewer believes that a governmental agency is in a better position than private enterprise to time the construction of projects according to economic needs. We have found that economic conditions bringing reclamation districts into existence are not those creating a demand for farms.[1] To supplement the author's policy, therefore, there should be a strengthening of Federal and State Government investigation and control of reclamation development not merely to safeguard investments of public and private funds but to protect the settlers themselves. The effect of the inclusion of poor soils in reclamation projects has not been given sufficient emphasis as one of the important causes of delay in development.

The discussion of future demand for land brings up that difficult and contested subject of the agricultural situation. In view of the divergent ideas of Warren, Nourse and others, and the analysis of the Division of Land Economics, which forms the basis of the author's statement, the reviewer feels that we cannot say what the next ten years will bring. On the one hand, a growing scarcity of land is indicated by declining per capita acreage in farms and in crops, declining per capita production, declining exports, increasing imports, constant or declining yields per acre, and, before the war, increasing land values and agricultural prices. Estimates of future land requirement have been made on the basis of many unknown factors. Additional factors which have been given too little attention in the book being reviewed, and in the analysis referred to,[2] are the comparative costs and advantages of producing and handling agricultural commodities in different countries, and the relative opportunities offered for employment in industry and agriculture as the economic status of these two branches of our economic structure fluctuate in relation to one another. We may be compelled to watch our agriculture decline and decay in spite of decreasing production, while the introduction of new methods

[1] Weeks, David, and West, C. H. The problem of securing closer relationship between agricultural development and irrigation construction. Calif. Ag. Exp. Sta. Bul. 435. 1927.

[2] Gray, L. C., et al. The utilization of our lands for crops, pasture and forests. U. S. Department of Agriculture. Agriculture Yearbook, 1923, p. 415.

and institutions may make possible a flourishing agriculture with constantly increasing production. These considerations merely strengthen the author's policy which would limit further reclamation construction at the present time, but do not weaken the insistence by the reviewer that, once a project is allowed to come into existence, it should receive all help possible in prompt, well-planned and scientific development.

David Weeks

University of California

In the death of Ray Palmer Teele, August 31, 1927, at Myton, Utah, the United States Department of Agriculture lost an able and faithful servant who had devoted well-nigh all of his career to its service. He entered the Department in 1899 as Economist and continued in its service with the exception of a brief interval until his death.

Mr. Teele was born in Fillmore County, Minnesota, in 1868. He attended the University of Nebraska, receiving the degree of A.B. in 1897, and A.M. in 1899. While in college he participated in numerous activities. He was a member of the Delta Tau Delta fraternity and continued his interest in it after leaving college. At the time of his death he was President of the western division of the organization.

In fact, it was characteristic of Ray Palmer Teele that he clung tenaciously to old relationships and old friendships, while he was even accumulating new friendships. By reason of his geniality and generous interest in others, there were probably few men in the Department with a wider circle of friends both within and without the organization.

Mr. Teele's special field of study was the economics of reclamation. He devoted himself assiduously to this subject for nearly thirty years. He was the author or co-author of a considerable number of bulletins on various phases of irrigation and drainage, and was detailed to the Bureau of the Census in 1910-1912 and again in 1920-1921 as special agent in charge of the irrigation census. In 1915 he published a book entitled *Irrigation in the United States.* Some of his writings have been translated and used as texts in other countries.

At the time of his death Mr. Teele had been for some years a member of the staff of the Division of Land Economics, Bureau of Agricultural Economics. In the course of his duties he had traveled widely and observed extensively economic conditions on irrigation and drainage projects in various parts of the country. It was during this period of his career that he crystallized his views with respect to Federal reclamation policies. It is fortunate that just before leaving the office for his last trip which ended in his death he had completed the manuscript and read the proof of his new book *Economics of Land Reclamation,* which effectively summarizes his attitude on this subject. While his associates believe he might have gone forward to greater usefulness if he had continued with us, it is not often that men are permitted to round out the work of a lifetime as effectively as Mr. Teele has done.

In the spring of 1927 the Department of the Interior requested the Department of Agriculture to lend them Mr. Teele for several months to

serve on a special commission of three to study the status of reclamation on Indian reservations. Mr. Teele was made chairman of the commission. The task was found more arduous and protracted than had been anticipated, and Mr. Teele was compelled to remain in the field, traveling all over the Rocky Mountain and Pacific States for a period of five months. He was stricken suddenly while inspecting some irrigation works on the Uintah reservation in Utah.

Mr. Teele leaves behind him his wife, Mary Hazard Teele, to whom he was married in 1897, and one son, Ray Palmer Teele, Junior, of this city.

L. C. Gray

The Harvest, by L. H. Bailey, (New York: Macmillan. 1927. Pp. 224. $1.50.)

"Essays in proportions" is Professor Bailey's own description of this new volume of his series of Background Books. And it is probable that ripe years, long experience, and a certain amount of detachment are necessary to a clear view of our situations and problems of today in their true perspectives and proportions. Those who are in the thick of the tussle with the situations or are in full cry on the trail of solutions naturally must spend most of their time and thought on the business in hand. Professor Bailey has at different times been both closely enough associated with and far enough removed from the problems of American farm life to give him the broad view, and his natural aptitudes for thought and reflection have given him deep understanding.

It is only in the first half of this volume that the economist, as such, will be interested. Even here we have no thorough-going analysis, but rather a commentary from a refreshing and individual viewpoint on many of the economic problems of modern agriculture. Land utilization, the decreasing farm population, corporation farming, the surplus, and taxation, are among the subjects which receive the most interesting treatment, and in their discussion many a maxim is ripened off for storing in the warehouse of memory. "The size of an acre varies directly with the size of the man who manages it." "In many cases, courage is more important than fertilizer." These seem fit companions for the adages of the master's eye and the master's footsteps.

Less acceptable to the economist may be the soliloquy on statistics and graphs in which a propensity to run wild on figures which have the appearance of finality they do not possess is met with the observation that they can never take the place of wisdom; that they may be guides to business but are not measures of life; and that in many ranges the graph can have no such value as a plain statement of judgment by a competent person.

Professor Bailey writes not only from the long-time point of view, but from the viewpoint of eventualities. Had all men lived, and thought, and practiced according to his precepts, we should have to-day no need for expedients, but the fact remains for the rest of us that they haven't. And Professor Bailey, himself, recognizes this fact in several ringing sentences: "It is shocking that we have not worked out comprehensive State systems . . . . if no further than to designate the regions that ought not

to be regularly farmed. . . ." "The balance between land and industry has not yet been struck." It is a conscious public policy in respect to agriculture that he wants and an end to what seems to him a drifting, pointless, *laissez-faire.*

That he looks toward the future as well as toward the past is frequently indicated. We are training the coming generations of farmers in a better way than formerly, he believes. We have touched only the borders of the sciences in their relation to agriculture, but we are setting the mind into new and truer ways of appraisal. The importance of tillage as an operation in the affairs of men is ahead of us rather than behind us.

Professor Bailey is standing at a point of pause and evaluation. He is taking time to differentiate between what is new and worth while and what is new and ineffective. In his own words, he no longer wants the scythe as a major agricultural instrument, nor does he need all the contrivances and conveniences of the present day. Scientific discovery, material goods, and what we ignorantly call progress are not part of civilization, he concludes, until they are incorporated in the soul rather than added to the inventory or worn on the body.

The "incomes" of the second half of the volume are not those dealt with by the economists. The morning and the twilight, the landscape and the skyline, are as important in the ledger here used as are the soil and the implements, the weeds and the weather. "What is my main satisfaction in farming?" said one farmer in answer to Professor Bailey's query, "Why not ask me which child I like best?" It is in these little sketches toward the back of the book that Professor Bailey best reveals his kinship with the agricultural philosophers through the centuries, from Cato to the sage of Edgewood. Fortunate the generation of farmers and farm-life students which has at least one seasoned philosopher among its spokesmen.

Caroline B. Sherman

Bureau of Agricultural Economics

Urbanization; Its Effects on Government and Society, by John Giffin Thompson. (New York: Dutton. 1927. Pp. xiii, 683. $6.00.)

The author is engaged in an extensive study of the subject of urbanization and rural depopulation in general, and this volume on the political and social consequences of the cityward movement is presented as one important phase of the subject. It is in the form of a comparative study of the differences between urban and rural civilizations and the problems arising from the growth of the city, as they have influenced the people of the United States, Great Britain, Germany, France, the Middle Ages, and even ancient Greece, Rome, China, and India.

While the book was written especially to set forth the political effects of urbanization, yet the social and moral phases such as religion, health, intemperance, crime, immorality, and divorce receive brief treatment. Not much attempt is made to distinguish between the effects of large cities, medium-size cities, and smaller cities and towns; nor between the effects of cities primarily commercial, primarily industrial, or primarily residential—though the effects of these probably differ widely.

The volume will be criticized by some readers because the author has consumed almost seven hundred pages in discussing the subject and has presented very few statistical data to back up the statements made. However, the author did not set out to attack the problem in that way but rather to assemble, study, and analyze the writings and opinions of statesmen, economists, sociologists, and philosophers, together with the evidence which they have presented in support of their attitudes. In other words, he did not attempt an original investigation from primary sources but aimed to assemble and digest all available literature in libraries. This is something that any investigator needs to do before going far with a research study, and Mr. Thompson has made a valuable contribution by making this thorough digest of the literature available, much of which is inaccessible to many students of the subject.

A feature of the book that greatly increases its value is the extensive bibliographies which are found at the end of each of the twenty-five chapters, these ranging from one to four pages in length. The reading pages are thoroughly annotated so that the reader can go to the original source for further discussion of almost every point taken up. Another special feature is the unusually complete cross-index, which covers sixty-five pages, and makes it easy to refer to particular items wherever discussed in the reading matter.

The final chapter in the book is entitled "Conclusions," and these may be breifly summarized as follows: The growth of the city from earliest times has exerted a powerful influence on civilization, giving it an impetus, but at the same time bringing new problems to be solved. The author states that these problems while primarily political are also to a considerable extent social, industrial, economic, and religious. And he concludes that "the city is the natural and superior habitat of men living together in political life; and the country is comparatively ill-adapted for human cooperation in the political sphere, just as it is ill-adapted for human cooperation in many other spheres of human activity."

Many readers will probably not agree with the author in his final conclusions; but all students of the subject will want to read the book. It is far from the final word on the subject, but it is a most valuable contribution.

University of Tennessee *C. E. Allred*

BOOK NOTES

[This list and the notes have been prepared by Mr. Mendum, largely from books listed in "Agricultural Economics Literature," a mimeographed publication prepared in the Library of the Bureau of Agricultural Economics. The attempt has been to describe the books sufficiently to indicate the nature of the material and the kind of interest readers may have in them.]

Social science research council. Advisory committee on social and economic research in agriculture.[1] *Preliminary report of a survey of economic research in agriculture in the United States during the year July 1, 1926-June 30, 1927.* [n.p., 1927] 4v. Mimeographed.

"Members of the American Farm Economic Association have for some time desired to make a survey of the research work being done in the field of agricultural economics. Through the aid of the Social Science Research Council a survey was made during the spring of 1927 which yielded a part of the materials desired. The results of this survey have been assembled and mimeographed in this preliminary form in order that those most interested in this subject may have this material in hand as a basis: first, of a discussion of scope and method in agricultural economic research at the next meeting of the American Farm Economic Association [Dec., 1927]; and second, as an aid in gathering additional materials, particularly with regard to methods of research. One other reason for issuing the report in this form is in order that mistakes may be corrected."—Introduction.

The material in volumes 1-3 is tabulated by States.

Volume 1 contains a Statistical Summary of the Results of the Survey of Research in Agricultural Economics by G. W. Forster.

Volume 2 contains a Report on Research Work in Farm Management by W. E. Grimes.

Volume 3 contains a report on Research in Marketing Farm Products by H. E. Erdman.

Volume 4 contains:

Cooperation by E. G. Noudse.

Investigations of General Farmers' Organizations by E. G. Nourse.

Commodity Production and Marketing by G. W. Forster.

Consumer Areas by J. D. Pope.

Foreign Competition, Foreign Trade, the Tariff and the Domestic Surplus in Relation to Agriculture by J. D. Black.

Prices of Farm Products by J. D. Black.

Agricultural Income by J. I. Falconer.

Land Economics by L. C. Gray.

Farm Labor by L. C. Gray.

Farm Credit by D. L. Wickens.

Agricultural Insurance by V. N. Valgren.

Farm Taxation by W. Coombs.

Transportation and Roads by G. F. Warren.

[1] Dr. H. C. Taylor, Northwestern University, 339 East Chicago Avenue, Chicago, Illinois, is Chairman of this Committee.

Social science research council. Advisory committee on social and economic research in agriculture.[1] *Preliminary report on rural sociological research in the United States during the year July 1, 1926-June 30, 1927.* [n.p., 1927] 119p. Mimeographed.

"The present report attempts a bird's-eye view of research studies in progress in the United States during the year July 1, 1926 to June 30, 1927. Studies begun before July 1, 1926, but still in progress or completed within the year, are included. The facts for the report were obtained by personal interviews at the research institution and with the persons responsible for the piece of research by Professors J. H. Kolb, Dwight Sanderson, C. C. Taylor, and Dr. C. J. Galpin. Personal interviews in some instances were impracticable and correspondence was then resorted to for facts.

"The research agencies making sociological studies during the past year are Land Grant Colleges; State Agricultural Experiment Stations; the Division of Farm Population and Rural Life of the Bureau of Agricultural Economics, the United States Department of Agriculture; colleges of arts and normal colleges and universities; specialized institutes or foundations of research; Federal bureaus, and some individuals."—Introduction.

The data are tabulated by states.

Chamber of Commerce of the United States of America. Domestic distribution department. *Retail and wholesale trade of Baltimore, Maryland; a detailed report on sales, merchandise outlets, number of establishments, employes, wages and inventories.* Based on a census of distribution conducted by the United States Bureau of the Census. (Washington, D.C., Aug., 1927. 58p. Mimeographed.)

The census of distribution, 1926, conducted by the United States Bureau of the Census appeared in the form of press releases for the following cities: Alameda, Calif., Atlanta, Ga., Berkeley, Calif., Fargo, N.D., Kansas City, Mo., Oakland, Calif., San Francisco, Calif.; combined figures for Providence, Pawtucket, Central Falls, North Providence, East Providence, and Cranston, R.I., Springfield, Ill., and Seattle, Wash. This constitutes an experimental census. In the words of Mr. Herbert Hoover taken from a letter to Hon. E. Hart Fenn in the Congressional Record for February 1, 1928, p. 2455, "These experiments were made possible through the material cooperation of various private agencies, including the Chamber of Commerce of the United States and the Chambers of Commerce in these various cities where the censuses were taken. . . . It is our feeling in the department that a national census of distribution would form the foundation for a marked advance in the efficiency of our marketing system, and I trust the committee will give careful consideration to the advisability of including it in the next decennial census."

Reports similar to the Baltimore report listed above, have been issued by the Chamber of Commerce of the United States, for Atlanta, Ga., Denver, Colo., Kansas City, Mo., Providence, R.I., Seattle, Wash., San Francisco, Calif., and Syracuse, N.Y. It is expected that the Chamber will issue a com-

[1] Dr. H. C. Taylor, Northwestern University, 369 East Chicago Avenue, Chicago, Illinois, is Chairman of this Committee.

pendium containing statistics for the whole group of cities included in the distribution census.

The Chicago Association of Commerce issued the report for Chicago which has the title: Wholesale and Retail Trade of Chicago, Ill.

Chamber of Commerce of the United States, Agricultural service. *Regional views on agricultural problems.* (Washington: Agricultural Service, Chamber of Commerce of the United States. Feb. 1, 1928. 20p. Mimeographed.)

A list is given, which shows the States covered by each of the regional conferences held. The "views" developed by these conferences are grouped under various subjects among which are credit, demand factors in production, production costs, surplus, taxation, and transportation.

U. S. Bureau of Foreign and Domestic Commerce. Domestic Commerce Series, No. 19. *Commercial survey of the southeast,* by John M. Hager. (Washington. U. S. Govt. print. off., 1927. 477p.)

"The present report presents and analyzes the major factors underlying distribution in the southeastern States, including North and South Carolina, Georgia, Alabama, Florida, and eastern Tennessee. The purpose of this survey is to present a picture of the fundamental economic conditions within the southeastern trade area, with particular reference to the marketing of products."

National industrial conference board, inc. Wages in the United States, 1914-1926. (New York, National industrial conference board, inc., 1927. 139p.) Chapter 5 is devoted to wages in agriculture.

Rhoades, E. L. *Introductory readings in marketing; commodity characteristics and marketing functions.* (Chicago & New York: A. W. Shaw Company; [etc.] 1927. 752p.)

The author in his preface writes as follows:

"Presented here is material which has been found useful in the teaching of beginning classes in marketing in the School of Commerce and Administration of the University of Chicago. To present to such classes the facts of marketing so that the principles of marketing developed would not be mere empty theories, it was necessary that text materials which would give a true picture of the many significant variations in the various markets be made available. . . . .

"The book is presented as a source of factual material which may fit in well with almost any organization of a marketing course. . . . .

"The greater part of this publication is not original except in the general idea of presenting in one text for comparative study a great variety of products. The first four chapters, in which the method of comparative study is explained, contain a new approach. This approach is proposed as a theory which will harmonize the functional and commodity concepts of marketing and will introduce a scientific method of approach based on the analysis of methods in terms of their causes."

In the section devoted to agriculture readings are given on wheat, corn, oats, barley, rye, etc., hay, cotton, wool, hides and skins, raw furs, leaf to-

bacco, livestock, eggs, poultry, dairy products, fruit and vegetables, potatoes, apples, citrus fruits, peaches, cherries, cranberries, onions, raisins, bananas.

Under the section devoted to Products of Forest and Mine will be found lumber and raw rubber and under Manufactured Products, textiles, paper, silk, canned goods, bread, coffee, tea, flour, meats, sugar, tobacco and farm machinery.

Characteristics from the productional standpoint of the various groups of peasant farms in the flax districts of U.S.S.R. Tables of bookkeeping analysis of 60 individual farms in the flax-producing part of the Volokolamsk district government, Moscow, by J. Anissimov, J. Vermenichev, K. Naoomov, and A. V. Tchayanov, collaborator. (Moscow; Scientific Research Institute of Agricultural Economics; 1927. Pp. 458. Preface and table headings in English.)

This book undertakes to give a general account of the present social differentiation of the Russian village with particular reference to newly formed social groups, and to establish from the viewpoint of production those fundamental organizations of peasant-farming which belong to each group. In all 65 farms have been described. There are 370 pages of tables, given in Russian and English, detailing ledger accounts according to the Italian system of bookkeeping. Questions dealt with include: Capital, labor, credit, distribution of land, livestock, dwellings, farm methods, buildings, machines and tools, crops, losses and profits, prices, trade, etc. There is also a map of the region investigated.—L. G. Michael, Bureau of Agricultural Economics.

The economic influence of Moscow on the organization of agricultural regions. (Moscow: Scientific Research Institute of Agricultural Economics; 1927. Pp. 125. *Summaries and preface in English.*)

This work contains three articles employing the method of "economic profile"; that is, the application of economic analysis to the blocking out of areas of supply and demand, etc., according to their economic relationships much the same as "natural sciences in their definition of different layers of earth, their structure limits, etc., adapt the profile method to a study of soils. . . ."—L. G. Michael, Bureau of Agricultural Economics.

BOOKS RECEIVED

King, J. S. *Cost Accounting Applied to Agriculture* as an aid to more productive farming. (New York: Oxford University Press, American Branch. 1927. Pp. xii, 183. $2.50.)

Prewett, F. J. *The Marketing of Farm Produce. Part II. Milk.* (New York: Oxford University Press, American Branch. 1927. Pp. viii, 84. $1.25.)

Hiley, W. E. *The Financial Return from the Cultivation of Scots and Corsican Pines.* Oxford Forestry Memoirs No. 6. (New York: Oxford University Press, American Branch. 1926. Pp. 32. $1.25.)

RECENT STATE PUBLICATIONS

Compiled by Mary F. Carpenter, Library, Bureau of Agricultural Economics, U. S. Department of Agriculture.

ALABAMA

Alabama. Dept. of agriculture and industries, Montgomery. Alabama farm production, v. 1, no. 1, Feb., 1928. 4p.

In co-operation with the Bureau of Agricultural Economics, U. S. Dept. of Agriculture.

A new monthly periodical which takes the place of Farm Economics, formerly published in Auburn. It will contain current information regarding production, value, and prices of crops, livestock, and livestock products.

Pope, J. D. The outlook for agriculture in Alabama in 1928. (Ala. Polytechnic Inst. Ext. Serv., Auburn. Circ. 103. 1928. 8p.)

ARKANSAS

Brannen, C. O. The farm tax problem in Arkansas. (Ark. Agr. Exp. Sta., Fayetteville. Bul. 223. 1928. 63p.)

"The method adopted . . . . is to show, first, the relation of property taxes to property income of selected groups, secondly, some evidences of inequality in the assessed valuation of individual properties under the present system of assessment and equalization, and third, the variation in revenues for the support of the public schools as a direct result of the local district system of taxation."

CALIFORNIA

California. Dept. of agriculture, Sacramento. Monthly bulletin, v. 17, no. 1, Jan., 1928.

Contains a number of short notes and articles economic in character.

California. Dept. of agriculture, Sacramento. United States standards for grapes, 1927. (Special publication 76. 1927. 14p.)

In co-operation with the Bureau of Agricultural Economics, U. S. Dept. of Agriculture.

Rauchenstein, Emil. Economic aspects of the apple industry. (Calif. Agr. Exp. Sta., Berkeley. Bul. 445. 1927. 76p.)

Part I is a discussion from the standpoint of the apple industry as a whole.

"Part II deals more particularly with the industry in California and includes the results of a survey carried on in co-operation with the United States Bureau of Agricultural Economics."

A bibliography is contained on pages 72 to 76.

Wellman, H. R., and Braun, E. W. Beans. (Calif. Agr. Exp. Sta., Berkeley. Bul. 444. 1927. 62p.)

One of a series on California crops and prices.

CONNECTICUT

Davis, I. G., and Jacoby, J. R. Five-year trends in Connecticut agriculture. (Storrs Agr. Exp. Sta., Storrs. Bul. 146. 1927. p. 111-238.)

Similar to Bulletin 127 "A description of Connecticut agriculture," which was based on the U.S. census of 1920. The data in this bulletin have been secured from the 1925 census and show the changes which have taken place in the five-year period.

FLORIDA

Blackmon, G. H. Pecan growing in Florida. (Fla. Agr. Exp. Sta., Gainesville. Bul. 191. 1927. 143p.)

Production, yields, harvesting, and marketing; p. 134-142.

GEORGIA

Georgia. State college of agriculture, Athens. The Georgia agricultural outlook for 1928. 12p. (Mimeographed.)

INDIANA

Purdue University. Agricultural extension service, Lafayette. Dairying and increased farm incomes in Monroe County, Indiana. (Ext. Bul. 149. 1927. 23p.)

IOWA

Weaver, Earl, and Oderkirk, Burt. Feeding dairy cattle. (Iowa Agr. Exp. Sta., Ames. Circ. 107. 1927. 56p.)

Feed costs are discussed on pages 4-5. Feed laws, pages 10-13.

KENTUCKY

MaGill, W. W., and Johnstone, W. C. Commercial strawberry growing in western Kentucky. (Ky. Univ. Col. of Agr., Agr. Ext. Div., Lexington. Circ. 216. 1927. 4p.)

MICHIGAN

Newton, R. W. Taxes on Michigan's rented farms, 1919-1925. (Mich. Agr. Exp. Sta., East Lansing. Tech. bul. 91. 1928. 34p.)

MINNESOTA

Black, J. D., and Zimmerman, C. C. Family living on successful Minnesota farms. (Minn. Agr. Exp. Sta., University Farm, St. Paul. Bul. 240. 1927. 25p.)

A further study of rural life in Minnesota, another one being Bulletin 234, How Minnesota Farm Family Incomes Are Spent.

This one is a study of 65 families selected because they were considered most successful in amount of income and in living conditions.

MONTANA

Fergus County, Mont., Agricultural economic conference. 1st, Lewistown, Mont., 1927. A program for the development of agriculture in Fergus County, Montana, based on farmer's experience. 1927. 47p.

Issued with co-operation from the Montana State College Extension Service, Bozeman.

Montana. Dept. of agriculture, labor, and industry. Div. of publicity and real estate, Helena. Montana. v. 2, no. 1. 1927.

Contains real estate laws and directory of brokers licensed.

Montana. College of agriculture and mechanic arts. Extension service, Bozeman. An agricultural program for the irrigated lands of southeastern Montana. (Bul. 88. 1927. 62p.)

"A report . . . . endorsed at the Agricultural Economics Conference held at Billings, February 17-18, 1927."

Montana. College of agriculture and mechanic arts. Extension service, Bozeman. Agricultural conference report, Lower Yellowstone district. (Bul. 89. 1927. 56p.)

Contains the findings and recommendations of the Agricultural Economic Conference which convened at Sidney, April 1-2, 1927, to draw up an agricultural program for the Lower Yellowstone Irrigation Project.

NEW HAMPSHIRE

Richardson, A. W. Poultry management at the University of New Hampshire. (N. H. Univ. Ext. Serv., Durham. Ext. Bul. 32. 1927. 31p.)

Marketing poultry and eggs; p. 25-27.

NEW JERSEY

Black, L. M. Egg production, monthly costs and receipts on New Jersey poultry farms, November 1926—October 1927. (N. J. Agr. Exp. Sta., New Brunswick. Hints to poultrymen, v. 16, no. 4. Jan., 1928. 4p.)

Fenton, J. M. The poultry and egg industry of New Jersey. (N. J. Dept. of Agr., Trenton. Circ. 130. 1927. 43p.)

New Jersey. Dept. of agriculture, Trenton. Twelfth annual report [for the year ending June 30, 1927]. 102p.

Report of the Bureau of Markets; p. 45-67.

NEW MEXICO

Walker, A. L. Farmers' cooperation in New Mexico, 1925-1926. (N. Mex. Agr. Exp. Sta., State College. Bul. 164. 1927. 58p.)

NEW YORK

Ross, H. A. The demand side of the New York milk market. (N. Y. Cornell Agr. Exp. Sta., Ithaca. Bul. 459. 1927. 86p.)

In co-operation with the Bureau of Agricultural Economics of the U. S. Dept. of Agriculture.

Contents: Method of analysis; grades of milk and cream sold; daily retail sales per family; types of variation in demand; application of demand data; appendix (containing detailed tables).

Van Slyke, L. L. Composition and prices of commercial fertilizers in New York in 1927. (N. Y. Agr. Exp. Sta., Geneva. Bul. 548. 1927. 20p.)

NORTH DAKOTA

North Dakota agricultural college. Extension division, Fargo. North Dakota farm outlook, v. 3, no. 5, Feb. 18, 1928. 16p.

The annual outlook number for 1928.

North Dakota agricultural college. Extension division, Fargo. Raising hogs in North Dakota. (Circ. 80. 1928. 8p.)

The hog outlook is presented on page 2.

OHIO

Foster, L. G. Economic aspects of Ohio farmers' elevators. (Ohio Agr. Exp. Sta., Wooster. Bul. 416. 1927. 77p.)

The study was made in 1924 and data were secured by means of a field survey. "The records, for the most part, are of companies that had weathered financial difficulties."

OKLAHOMA

Agricultural outlook for Oklahoma, 1928. (Okla. Agr. Exp. Sta., Stillwater. Circ. 68. 1928. 21p.)

OREGON

Oregon agricultural college. Extension service, Corvallis. Agricultural outlook for 1928. 40p. (Mimeographed.)

PENNSYLVANIA

Charles, T. B. Seasonal broiler production. (Pa. Agr. Exp. Sta., State College. Bul. 216. 1927. 19p.)

Contains poultry feeding data and cost of production.

James, D. M., and McFeely, H. F. The market for Pennsylvania fruit. (Pa. Dept. of Agr., Harrisburg. Gen. Bul. 446. 1927. 35p.)

"The Bureau of Markets has collected records for the six-year period, 1921 to 1926, to determine the origin of all carloads of fruits and vegetables unloaded in 15 Pennsylvania cities annually." The commodities covered in this bulletin are apples, peaches, and grapes.

Lininger, F. F. Egg marketing by farmers in Pennsylvania. (Pa. Agr. Exp. Sta., State College. Bul. 214. 1927. 20p.)

"A study of prices and costs by various methods of marketing."

SOUTH CAROLINA

Jensen, W. C., Russell, B. A., and Carkuff, A. M. The year ahead in South Carolina agriculture. (S. C. Agr. Exp. Sta., Clemson College. Bul. 246. 1928. 62p.)

What a farmer's thoughts might be at seed time and at harvest are recorded on the cover page of this agricultural outlook report.

Johnson, T. D., Robinson, F. H., Russell, B. A., and Jensen, W. C. An economic study of the Columbia farm trade area. (S. C. Agr. Exp. Sta., Clemson College. Bul. 243. 1927. 64p.)

In co-operation with the Bureau of Agricultural Economics, U. S. Dept. of Agriculture.

This area includes the counties of Richland, Lexington, Saluda, Calhoun, Fairfield, and Kershaw.

Rawe, E. H., and Owens, C. A. Growing and marketing South Carolina asparagus. (Clemson Agr. Col., Ext. Div., Clemson College. Bul. 85. 1928. 23p.)

South Carolina. Agricultural experiment station, Clemson College. Fortieth annual report for the year ended June 30, 1927. 106p.

Research work in agricultural economics; p. 68-81.
The power unit as related to the cost of producing cotton; p. 97.
List of projects under way, Agricultural Economics Division; p. 104.

TEXAS

Smith, H. P., and Spilman, R. F. Harvesting grain with the combined harvester-thresher in northwest Texas. (Tex. Agr. Exp. Sta., College Station. Bul. 373. 1927. 24p.)

In co-operation with the Bureau of Agricultural Economics and the Bureau of Public Roads, U. S. Dept. of Agriculture.

"The object of this study was to find out what might be accomplished with the different types and sizes of combines under actual farm conditions, their cost of operating, and the economic changes likely to be brought about by the introduction of the combine."

Texas. Dept. of agriculture, Austin. Farm acreage, values, ownership and tenancy. . . . Farm indebtedness and expenditures, number and value of principal livestock and other industries. (Bul. 89. 1927. 162p.)

A revision of Bulletin 76, 1924. Most of the data are taken from the U. S. census.

UTAH

Cardon, P. V., and Thomas, W. P. The agricultural outlook for Utah, 1928. (Utah. Agr. Exp. Station., Logan. Circ. 70. 1928. 16p.)

Esplin, A. C., Peterson, William, Cardon, P. V., Stewart, George, and Ikeler, K. C. Sheep ranching in Utah. (Utah Agr. Exp. Sta., Logan. Bul. 204. 1928. 58p.)

Peterson, William, Cardon, P. V., Ikeler, K. C., Stewart, George, and Esplin, A. C. Cattle ranching in Utah. (Utah Agr. Exp. Sta., Logan. Bul. 203. 1927. 56p.)

The two bulletins listed above are reports of a preliminary economic survey of the ranch situation and are based upon investigations carried on in co-operation with the Bureau of Agricultural Economics and the Bureau of Animal Industry, U. S. Dept. of Agriculture.

VERMONT

Gans, A. R. Elasticity of supply of milk from Vermont plants. Factors affecting average deliveries per patron. I. The milk-feed price ratio. (Vt. Agr. Exp. Sta., Burlington. Bul. 269. 1927. 40p.)

The first of a series dealing with this subject. "It is expected to extend the study . . . . during the coming years."

Young, H. P. Studies in Vermont dairy farming. III. Randolph-Royalton area. (Vt. Agr. Exp. Sta., Burlington. Bul. 268. 1927. 64p.)

The third of a series of economic studies of which Bulletin 250 was the first and Bulletin 256, the second.

VIRGINIA

Virginia. Dept. of agriculture and immigration, Richmond. Bulletin 241. 1928. 112p.

Partial contents: The agricultural situation today and its future, p. 8; activities of the Division of Markets, p. 16; Division of Agricultural Statistics, p. 33; farm management suggestions, p. 76.

WISCONSIN

McNall, P. E., and Mitchell, D. R. Success with 80 acres. (Wis. Univ. Col. of Agr., Ext. Serv., Madison. Circ. 216. 1927. 15p.)

The story, principally in his own words, of a farmer who has managed his farm successfully for seven years in Fond du Lac County.

Russell, H. L., and Hatch, K. L. A wiser use of Wisconsin land. (Wis. Univ. Col. of Agr. Ext. Serv., Madison. Circ. 219. 1928. 47p.)

A bulletin for popular use on how to improve the farm and farm home. It includes several pages on "Keeping Track of Income From Land" and "Better Marketing."

Wisconsin. Dept. of markets, Madison. Handbook of Wisconsin hay standards. 1927. 43p.

Wisconsin. Agricultural experiment station, Madison. Forward steps in farm science. Forty-fourth annual report, for year ended June 30, 1927. (Bul. 396. 1927. 135p.)

Discussions of agricultural economics topics are given on pages 5-20.

Publications From the Bureau of Agricultural Economics[1]

Issued January 15-March 17, 1928.

TECHNICAL BULLETINS

40 Agricultural cooperative associations, marketing and purchasing, 1925, by R. H. Elsworth.

Voluminous data on cooperative associations: Historical, geographical, kind of business, size of business, membership, pretty much anything anyone wants to know that can be pried loose from the associations by correspondence supplemented by visitation in person and by proxy. Supersedes other bulletins on the subject now mostly out of print.

57 Cooperative marketing of livestock in the United States by terminal associations, by C. G. Randell.

The first of these agencies now in operation started in 1917. In 1926 there were 25 operating on 19 markets. This bulletin describes all of them in considerable detail from their beginnings, their trials and tribulations, their successes and failures.

63 Cooperative marketing of grain in western Canada, by J. F. Booth.

The background and development of cooperative grain marketing in the Prairie Provinces through October, 1927. The wheat pools, which have dominated the grain-marketing situation in Canada since 1924 are fully described. "In Canada, the experiences of more than two decades formed a natural setting for the development and successful operation of the wheat pool, whereas in the United States quite the opposite situation prevailed. . . . ." As nearly as possible the whole story is given without much clue to the author's opinions on controversial points.

1375 (Department Bulletin series). The Brown-Duvel moisture tester and how to operate it, by D. A. Coleman and E. G. Boerner.

STATISTICAL BULLETIN

22 Vegetable statistics. Year ended December 31, 1926, with comparable data for earlier years.

This is one of a series now so well known that the title and the series number describe the publication well enough to one who wants statistical tables in detail. It has 264 pages of tables of crop and market statistics and other related data for producers and market men.

CIRCULARS

9 The Bates laboratory aspirator, by E. N. Bates and George P. Bodnar.

Description of an ingenious device for separating granular substances by air.

10 Joint use of a sales organization by two cooperative associations, by Kelsey B. Gardner.

Describes the arrangements under which the deciduous fruit of the California Fruit Exchange is sold through the citrus-fruit sales organi-

[1] Mimeographed preliminary reports and periodicals are not listed on account of the limited number of copies available for distribution. Notes by S. W. Mendum.

zation maintained by the California Fruit Growers Exchange. The citrus sales organization has been able to handle deciduous fruits to the advantage of both exchanges, as there is a somewhat better distribution of sales effort over the year. The suggestion is that other cooperatives may find that they can employ joint sales organizations, but the warning is prompt that certain requirements are to be met before success is assured.

24 United States grades, color standards, and packing requirements for honey, recommended by the U. S. Department of Agriculture. (Revision of Department Circular 410.

FARMERS' BULLETINS

1551 Marketing farm produce by parcel post, by Lewis B. Flohr.

While marketing by parcel post did not reach the volume of business generally expected of it, the volume seems to have been kept up and this revision of an earlier bulletin on the subject was prepared to meet the constant call for information on how to prepare products for sale by post.

1560 Preparing strawberries for market, by R. G. Hill.

A revision of Farmer's Bulletin 979.

1562 Farm practices under corn-borer conditions, by Jesse W. Tapp, George W. Collier, and C. R. Arnold.

"This bulletin discusses the character of the problems in different parts of the infested area; indicates the control practices best adapted to different conditions; and points out the factors farmers should consider in deciding whether to reduce their corn acreage." Information obtained from 750 farmers forms the basis for many of the statements.

MISCELLANEOUS PUBLICATIONS

17 Crop report regulations. 1928.

Time and scope of the crop reports scheduled for release in 1928.

19 The agricultural outlook, 1928.

Bigger and better than previous attempts. Has anyone failed to see it?

Service and Regulatory Announcement 109. Items relating to the administration of the U. S. cotton futures and cotton standards act.

Handbook of official grain standards for wheat, shelled corn, oats, feed oats, rye, grain sorghums and barley.

Handbook of U. S. standards for beans.

Publications of the Department of Agriculture for 25 Years

Miscellaneous publication No. 9 gives a list of all the publications of the U. S. Department of Agriculture for the period January, 1901 to December, 1925, inclusive. Mabel G. Hunt is compiler.

AMERICAN INSTITUTE OF COOPERATION

Preliminary Announcement

The American Institute of Cooperation will hold its fourth annual summer session on the campus of the University of California in July of 1928.

The program for the session in California involves three distinct phases: (1) A field trip of a week beginning July 9 in Los Angeles, during which various cooperative organizations of the State will be visited. This trip will end on Saturday, July 14, at Berkeley. (2) There will be a two weeks' cooperative trade conference at the University of California at Berkeley beginning July 16 and ending July 28. (3) A number of courses dealing with cooperative marketing will be offered at the University of California. These will continue for a period of four weeks beginning on July 9 and ending on August 4.

All of the work will be closely related and part of a general program. For example, the field trips will be designed to give visitors a background of field conditions and cooperative lay-out and plant facilities in a number of typical instances in order to give later discussions a concrete basis of fact.

At the trade conference at Berkeley there will be every day from four to six talks by outstanding leaders in the cooperative movement. Opportunity is always provided for discussion so that any points not clearly presented or of debatable nature are fully discussed. These sessions should be of particular interest because of the large number of nationally known Pacific Coast organizations which will be represented.

The university courses which are to be offered by the University of California will be courses in the upper division group. Students who enroll in these courses may enroll on July 9, either at Berkeley or at the headquarters of the field trip group at Los Angeles. In other words, arrangements will be made to have a portion of the instructional staff accompany the group which takes the field trip and to have another portion of the staff take care of the classes at Berkeley. All who can possibly do so are urged to take the field trip. After July 16 all class work will be at Berkeley. Plans are being made to provide free automobile or bus transportation at Los Angeles, Fresno, and Berkeley for trips radiating from those points. Detailed plans will be announced later.

All persons who expect credit for University courses will be required to continue work until August 4, and will be expected to attend the trade conferences in lieu of doing library reading during the period of those sessions. These University courses are open only to students who are qualified to take other University courses, and they carry 2 units of credit each. A student may take two courses.

Two kinds of courses will be offered: (1) Courses of an elementary nature for those who have not taken courses in cooperative marketing, (2) specialized courses. Thus students who have had no courses in cooperative marketing will be expected to take an elementary course and one specialized course, whereas others may take two courses of a specialized nature. All students taking work for credit will be expected to participate in a conference course. Special conference sections will be provided for those interested in high school teaching.

At the 1927 session of the Institute there were in attendance during various parts of the session representatives of about 160 cooperative associations doing business in over forty States. In addition, there were representatives of all the leading general farm organizations, of twenty-one colleges and universities, six branches of the Federal Government, and fourteen State departments; also persons from the Philippine Islands, from three provinces of Canada, from Ireland, India, Japan, Mexico, Poland, Germany, and England.

The American Institute of Cooperation has become a clearing house of information regarding the progress of the cooperative movement, and a medium through which cooperative executives are reaching common understanding. It is apparent that the cooperative movement must be considered one of the permanent forces of American life. Cooperative business already aggregates two and one-half billion dollars a year and shows every indication of continued growth. The cooperative movement represents the farmer's effort to help himself attain a higher standard of well-being.

For further details write to Division of Agricultural Economics, College of Agriculture, University of California, Berkeley, California.

WESTERN SOCIETY OF FARM ECONOMICS

Preliminary Announcement of 1928 Meeting

The Western Society of Farm Economics will hold its second annual meeting this summer at the University of California, Berkeley, as agreed last year at organization. The exact date of the meetings has not yet been stated as it is planned to hold the meetings either before or after the trade conferences of the American Institute of Cooperation at Berkeley, as seems to suit the convenience of the most persons who could attend. The invitation is quite general.

The meetings will extend over two days, and will be devoted to discussion of the aims and methods of research in farm economics, with particular reference to the formulation of a sound agricultural policy and workable extension programs of needed readjustments. There will be a general survey of the chief types of research projects in agricultural economics followed by round table discussion of each of as many of the types as feasible from the following fields: Marketing, Farm Management, Price Analysis, Commodity Supply and Price Outlook Studies and Consumer-Preference Studies.

Professor Sherwood W. Shear, Chairman of the Program Committee, wishes to hear from any who may be able to attend these meetings, at first for the purpose of deciding the most generally satisfactory dates (July 13 and 14 or July 30 and 31 are the most likely dates), later to give desired information. Address him at University of California, Berkeley, California.